AMERICAN MACHINIST

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ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

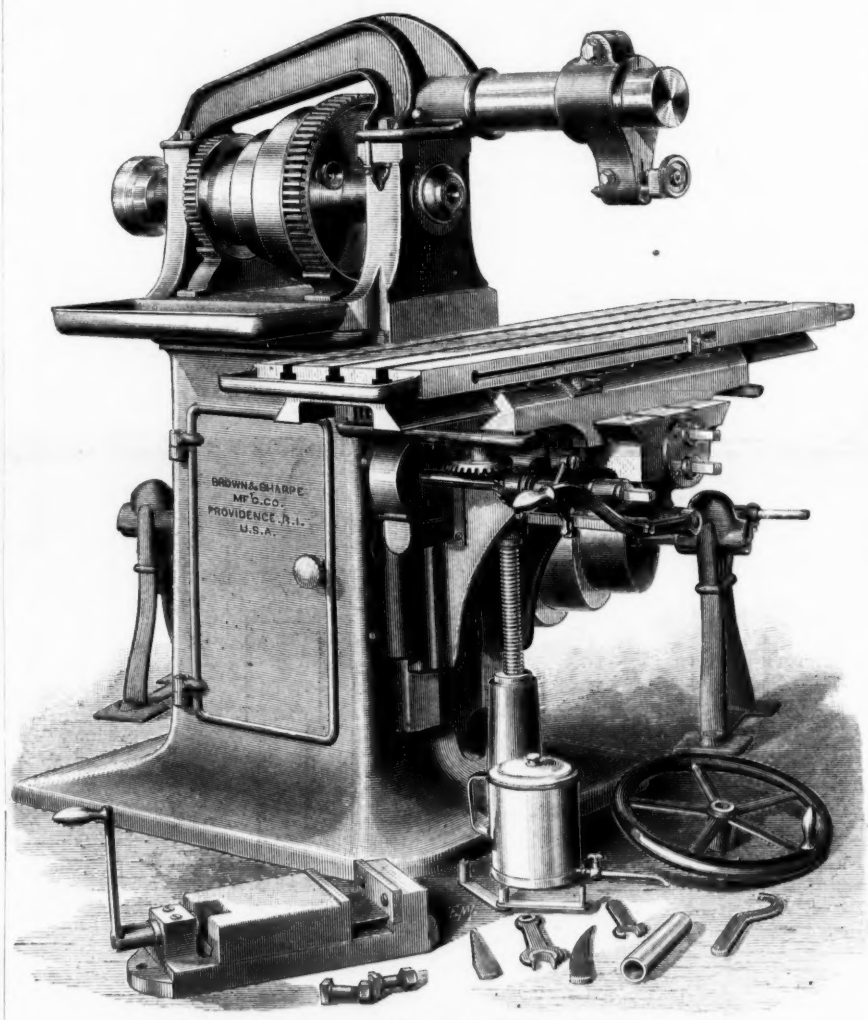
New Large Plain Milling Machine.

The engraving on this page represents a large size plain milling machine, recently brought out by the Brown & Sharpe M'f'g Co., Providence, R. I. This machine is designed for the use of steam engine and tool builders, and for general machine shop use; it having a capacity for doing a large class of work usually done on a planing machine, as well as special work that can only be done with difficulty on a planer. The parts, such as the base, cone, spindle, gearing and the supporting arm are the same as used in the large universal milling machines made by the same company.

The platen is 48″ in length, 14″ in width, and has T slots extending lengthwise to be used in clamping work. This platen has a horizontal feed movement of 26″, and a movement at right angles to this, or in line with the axis of the spindle, of 7¼″. The perpendicular movement is from the center of the spindle to 19¼″ below. The movements, both horizontal and vertical, can be adjusted to thousandths of an inch by means of a pointer and dial.

Three changes of feed adapt the machine for use on metals of different qualities, and the various adjustments permit cutting to be done on the top and sides and over a large surface, without changing the position of pieces.

The vise furnished with the machine for convenience in holding small work, has steel jaws 7″ long by 1 1/16″ deep, which will open 4½″. This vise can be adjusted and held on the platen at any desired angle. Countershaft and hangers are furnished, together with necessary wrenches, etc. Three 16″ pulleys are used on the overhead-shaft, for two 4½″ belts, allowing the cutters to be run in either direction.



NEW LARGE PLAIN MILLING MACHINE

Testing and Selecting Steel.

BY S. W. GOODYEAR.

I must present to the army of readers of the AMERICAN MACHINIST some further facts (as they appear to me from observation and experiment) of great importance, applying to the selection of steel for various uses, ranging from the roughest purposes of construction in bridges, buildings, railways, &c., to the finest of dies and tools requiring the greatest amount of tenacity, and durability of cutting edge or working surface.

Beginning with the proposition that for any use in which steel has been known to fail there is no such thing as selecting that which is too good, remembering that different uses require different steel—that which is best for some uses not being even good for others—I wish to endeavor to make clear to those who read, as it is to myself, that *condition* in steel is of no less importance than *quality*, or rather, that the condition of steel controls its quality, as judged by practical results in its use, fully as much or more than do the constituent parts of which it is composed.

In my remarks upon this as upon other subjects, I am obliged to confine myself to the plain mechanic's understanding of the matter, drawing some conclusions from experiments made by some of the most prominent technically educated mechanics, others from my own simple "by rule of thumb" experiments.

As safety from breakage under strain or shock, wearing qualities, quality of resistance to indentation or abrasion under pressure or friction are to be considered, it becomes necessary from the start that there shall be no misunderstanding of what certain tests, made with a view to show the quality and value of steel, actually do show. Especially is it necessary to avoid falling into the error of believing that because certain tests of any particular steel have shown certain results, such results must of necessity follow other tests of the same steel; for in different conditions, different results must be looked for in the same steel.

To the investigator there is probably no question presenting more anomalous and directly contradictory conditions. In practical use steel is often found to be the least safe in its condition of greatest strength, and strongest or safest when in its weakest condition. To illustrate: A steel requiring 140,000 lbs. to the square inch of tensile strain to produce rupture when tested in an unannealed condition, may, after annealing, be broken at 100,000 lbs., perhaps less, and still be in a practically stronger and safer condition than before for most uses, because it will stand an amount of deflection, or torsional strain, not as tested in pounds, but in relative change of position of parts composing the mass, which would have inevitably broken the stronger, because harder steel.

Steel is supposed to be brittle, and weak, when hardened by heating and suddenly cooling in cold water. So it appears as usually hardened, and to overcome the brittle condition the temper is drawn. I long since learned, by having been forced to resort to the sledge to break pieces of hardened steel with temper undrawn, which could easily be broken with a hand hammer before hardening, to contradict the *ipse dixits* of writers who positively assert that steel by hardening in water is made weaker, and will break under less strain than before. Does the reader say this is true? It is true, just as it would be true to say that tea and coffee are drank *with* sugar and cream. So they are *without*. "Steel *is* made weaker by hardening in cold water," but *not necessarily*. Proof: After seeing a number of pieces of steel in a semi-annealed condition broken by tensile strain, the ultimate strength being from 104,000 lbs. to 110,000 lbs. or 115,000 lbs. to the square inch, one piece only reaching 123,000 lbs., this steel being of a quality which would have shown without annealing about 140,000 lbs., I have taken other pieces of the same steel, from the same bars, and heating them in an open fire, laying them directly on a bed of coals, and plunging them when hot into cold water, have had them tested for tensile strength without drawing the temper. They were shown to be hard enough to cut glass, and I found that some of them broke at less than 100,000 lbs. Say the books and their champions, "We told you so." Wait a little: Several of the hardened pieces required a tensile strain of over 150,000 lbs. to the square inch to break them, and one piece *broke only at* 211,000 *lbs.* Was it not fully proven that the strength of steel *can be increased* by cold water hardening? That some of the pieces were not as strong as before hardening simply proved that they were heated too hot. Are the tests by tensile, torsional, and transverse strain as indicated in pounds as conclusive as they are judged to be? Of two pieces of steel precisely alike, except in condition, one might be adjudged upon testing to be much inferior to the other, simply because it is annealed to a softer condition. Again, of two pieces, one of which is vastly superior to the other in strength, when in proper condition, the better might be condemned as the poorer.

I do not lack respect for, and appreciation of those tests in which resistance to torsion or to deflection, as measured in pounds, is depended upon to determine the comparative merit of two steels. It strikes me, however, that there are many cases in which the mechanic's methods of testing will be a better guide in determining quality, and condition, than any array of the most carefully recorded figures taken from the result of tests as sometimes made for transverse or torsional strength, said methods having no reference to the amount of force required, but aiming simply to learn by the amount of deflection or torsion that steel will stand, what its powers of endurance are.

In some tests for transverse strength, each piece, when bent beyond the power to longer sustain the load by which it is bent, is recorded as broken. Its quality is adjudged by the number of pounds it sustained without deflection; by the load at different points of deflection, or amount of load at different amounts of deflection; and finally, by the maximum load and amount of deflection at which it is called broken, when it is not broken at all.

Where tests to determine torsional resistance merely are made, and record is kept of the force required to twist, or to twist off the piece in the "by the pound" method of testing, there will be danger of adjudging that piece the best which carries the greatest load. Yet by the plain simple test of the mechanic it will be found vastly inferior. To explain: Of two pieces deflected, each a like amount, but requiring different amounts of force to produce the deflection, the apparently stronger piece may be acutually broken in an attempt to straighten it, while the supposed weaker piece, (and too often judged to be inferior simply because of such apparent weakness) may be not only straightened, but deflected as far in the opposite direction, and so back and forth several times before breaking. In the torsional test the piece requiring the greatest force to twist it at all, may be broken at less than a single turn, while a piece of apparently less strength may be twisted round and round a dozen times without breaking, and still retain an almost perfect surface, and show a fracture without a flaw. Still the stronger piece, as per avoirdupois test may at the same time have broken with an evident unsoundness of structure, and with every part of its surface broken up and disturbed. It is not simply strength to stand a certain amount of strain once, but power of endur-

ance to stand under a *succession of shocks*, or deflections, or under continued transverse or torsional strain, that constitute the qualities which steel is often called upon to show. These qualities depend largely upon its condition of hardness, or softness and density as affected by working, or annealing, making it necessary for the man who makes tests to determine quality, to know by what methods the steel has been put in the condition in which he is to test it. He must also be well posted as to the effect of these methods, and must know further whether they have been properly applied. For example, two pieces of steel may be annealed, one with great advantage for the use to which it is to be put, the other to great disadvantage—even to making it worthless. Still both are annealed.

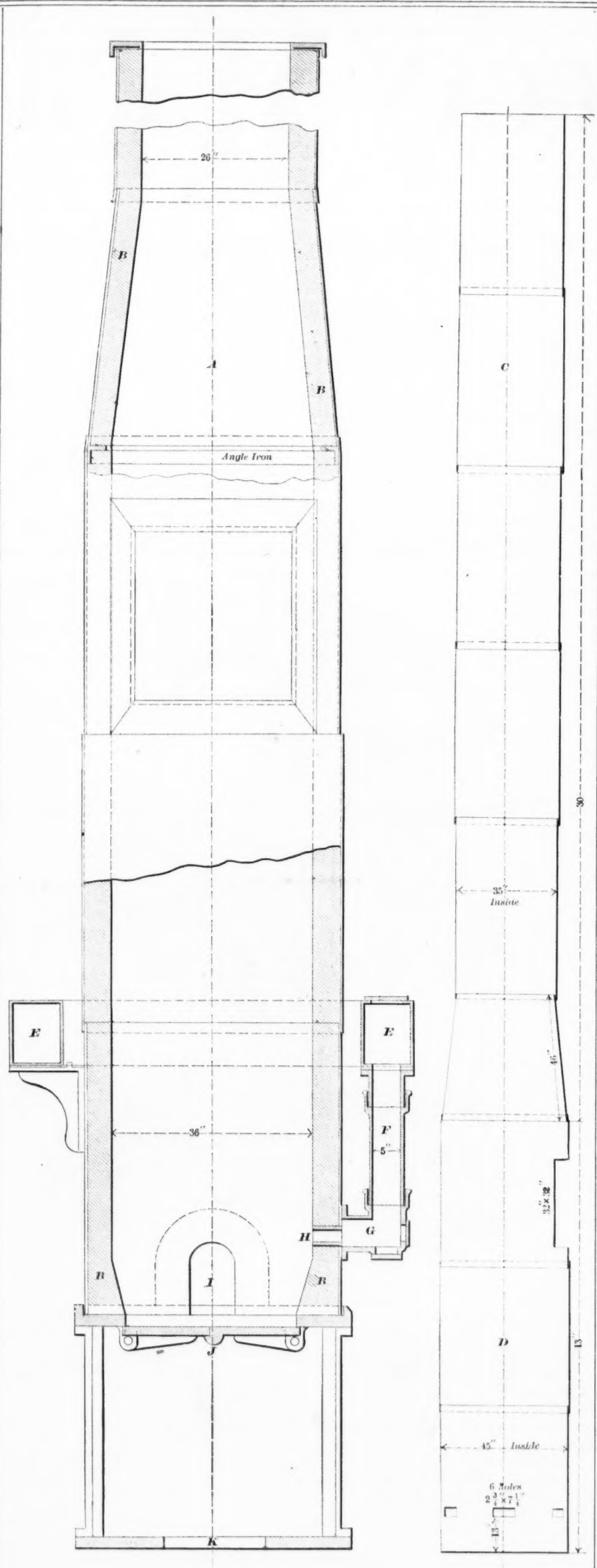
To anneal a piece of steel which shows a fine, clear, uniform condition of structure as judged by fracture previous to annealing, so that it shall show after annealing a coarse, uneven, open grained condition when judged by fracture, is to put the steel so treated in a condition of weakness, which will be shown when tested by the avoirdupois method, and also by the test for continued endurance. Those who believe that annealing necessarily removes the close-grained, reliable condition in which steel may be put by proper working, should learn by experiment that they have been mistaken.

There are thousands of complaints made daily of lack of uniform quality in steel where the *condition*, not the *quality*, are at fault, and in very many cases those who make the complaints are wholly to blame for the apparent lack of uniformity. Other cases in which the consumer using the material as he receives it from the manufacturer, and insisting upon applying certain tests, returns as worthless that which might, in proper condition, have been admirably adapted to his wants, are common.

Differences in amount of heat, the length of time taken to heat, the heat at which steel is worked, the heat at which the work ceases, the manner in which the working is conducted, in what way the steel cools off after the working ceases, the method of annealing and care with which the operation is performed, the subsequent working, as in wire-drawing or other manipulations in a cold state, whether much or little, and how; whether by successive gentle transformations of shape or size, or by some violent disturbance of molecular structure, are some only of the points which the plain mechanic has constantly before him in his efforts to give satisfaction to the customer, or to himself get satisfaction in the use of steel furnished to him by others. While with care and good judgment growing out of long experience and observation, he places such steel as passes through his hands in condition to meet the requirements called for when put to either tests in use, or tests scientific, ought he not to have full credit for the crude methods of test by which he determines whether his efforts are successful? Breaking the ingot or bar, and by the fracture judging of quality and condition; bending the sheet until broken for the same purpose; with a dexterous turn of the wrist and a pull learning in an instant whether the wire passing through his hands is being put in proper condition to meet the requirements of scientific tests to which it is to be subjected. The right steel he must have, but none the less must the steel have the right treatment.

Preparing Molding Sand.

The St. Louis *Age of Steel* says: "A stove foundry in this city, a few years ago, had an excellent system for drying and preparing sand for the molders. The green sand was first poured into a large, shallow, drying pan, which had been placed upon a number of steam heating pipes, and was thoroughly dried. The sand was then screened, the finer sand, including drift sand, passing through the screen and the strong sand in the shape of lumps remaining in it. The strong sand was then taken to a crusher and crushed and afterwards was put through a bolting machine. In this way all the worst sand was deposited in a heap by itself, and the percentage of castings spoiled by drift sand was very materially reduced. The prepared sand was fine and strong, and suitable either for renewing worn-out sand or for mixing with the sand first deposited from the screen. Previous to the adoption of this system in the foundry the percentage of castings lost was large, and the work turned out was very rough, for if the sand contained much drift sand the iron would cut the latter and the casting would be spoiled; but if this did not happen, the face of the work would be rough, owing to the coarseness of the sand By using sand prepared in the way we have described, the percentage of castings spoiled was not only reduced, but the quality and the face of the work were much improved. The method of preparing sand in the East—notably in Philadelphia—is to dry it in kilns and then crush it and bolt it. In the West, however, it is generally used as it comes to hand, the moulder riddling and mixing it as he needs it."



FOUNDRY CUPOLA.

Foundry Cupola with Details.

In our description of the new foundry recently built by the Holyoke Machine Co., Holyoke, Mass., which appeared in the AMERICAN MACHINIST of Jan. 27, 1883, we promised to show the cupola in a future issue. The accompanying engravings represent one of the cupolas used in the foundry above alluded to, *A* being a sectional view through the center. The part representing the charging door alone, is an outside view. The circular cast iron plate *K*, is placed upon a good foundation, while the bottom plate of the cupola containing doors, *J*, is supported by strong cast iron legs, as shown. The lower or straight part of the cupola is 45″ diameter inside and made of boiler plate ½″ thick. It is lined with fire-brick, so that when completed the diameter is 33″, being contracted at the bottom as shown at *B B*. The hole for tapping is shown at *I*. The upper part above the angle iron is made of iron ⅜″ thick, which is lined with fire-brick to a diameter of 26″ inside, *B B* representing the brick. *C, D* shows the entire length of the cupola.

The air box, with pipes and tuyeres are peculiar features of this cupola. The air-box proper, *E, E*, is made in three pieces, as will be observed in the plan, page 3, where *L, L, L* represents the joints. These joints are made slightly elastic, so that any unusual expansion or contraction will not be liable to break the casting. *G* represents the air-pipes to the tuyeres, of which there are six.

These pipes also are made with lead joints, as shown at *F, G*, in the sectional view, but will be more readily understood by an inspection of the smaller engravings of tuyere pipe. The bottom pipe *A*, has a flange for bolting to the shell of the cupola.

This pipe is likewise shown at *C, D*.

F has a flange at the top for bolting to the air-box. The short upright pipe, *B, E*, allows free expansion and contraction of the parts without the slightest danger of breaking. The dimensions of each part are all plainly marked. It will be observed that all the passages have hand-holes for inspecting and for cleaning out all obstruction that might interfere with the free entrance of the air.

The door frame for the charging door is so constructed that there is little probability of its breaking.

To use a shop term, "it was broken when it was first made," without giving the heat a chance to demonstrate what it could accomplish in that direction. Instead of making the door frame in one whole piece, it is made in four pieces mitered together at the corners, as shown. The doors are lined with fire-brick, in the usual way. This engraving also shows a sectional view of a top ring for the stack, besides brackets for supporting the wind-box.

The tuyeres are 2″x6½″ and are shown in three views. The casting that surrounds the tapping hole is also here represented.

This cupola is operated by a No. 4½ Baker blower, which runs at a speed of 110 revolutions per minute. From the time the blower starts until the iron flows, the time is generally eight minutes. Eight thousand eight hundred pounds of iron have been melted in this cupola in one hour and thirty-five minutes, which we consider remarkably good work.

The assessed valuation of taxable property in El Paso, Texas, is $2,123,907. In 1881 the assessed value of taxable property of El Paso county was $1,047,420. In 1882 the assessed value had reached $3,674,444. This extraordinary progress is due largely to railroad enterprise.

Annual Meeting of the American Institute of Mining Engineers.

The Secretary of the American Institute of Mining Engineers, Thomas M. Droun, has sent out the programme for the annual meeting of that society, to be held in Boston, Mass., Feb. 20th. It is arranged as follows:

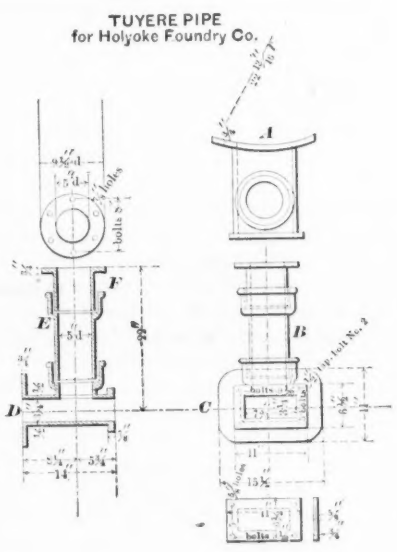
Tuesday, February 20th. Opening session at 8 o'clock P. M., at the Brunswick Hotel. Address of welcome by Mr. Edward Atkinson, and by Mr. Thomas Doane, on behalf of the Boston Society of Civil Engigineers. Reading and discussion of papers.

Wednesday, February 21st. Session at 9 A. M., at the Massachusetts Institute of Technology. Excursions from 12 to 5 o'clock, visiting the Leavitt Pumping Engine, the Carson Sewer Excavating Apparatus, and the Norway Iron Works. Evening session at 8 o'clock at the Institute of Technology.

Thursday, February 22d. Excursion by omnibus at 8.30 and 9.30 A. M; to the Watertown Arsenal, to inspect the United States Testing Machine. At 11.30 to Harvard University. Lunch will be served at 2 P. M. at Alumni Hall. Session at 3 P. M. in Room 11, Seaver Hall. Return to Boston at 5 o'clock. Subscription dinner at 8 o'clock at the Brunswick Hotel.

Friday, February 23d. Final session at 9 A. M. at the Institute of Technology.

Mr. James B. Francis will make arrangements to conduct an excursion to Lowell, to visit the extensive water works, and one of the cotton mills.



Members are invited to stop over at Worcester, on their way home, to visit the Worcester Free Institute, and also some of the manufactories of the city.

The following papers have been announced:

Gas Producer Explosions. By P. Barnes, Elgin, Ill.

Microscopic Analysis of the Structure of Iron and Steel. By J. C. Bayles, New York City.

Metallurgy of Nickel in the United States. By W. P. Blake, New Haven, Conn.

The Mining Regions about Prescott, Arizona. By John F. Blandy, Prescott.

The Collection of Flue-Dust at Ems. By T. Egleston, New York City.

The Eozoic and Lower Palaeozoic in South Wales, and their comparison with their Appalachian Analogues. By Dr. Persifor Frazer, Philadelphia.

Note on the Geology of Egypt, with especial reference to the Rocks from which the Obelisks have been taken. By Dr. Persifor Frazer.

Notes on a Protected Iron Hot-blast Stove. By Frank Firmstone, Easton, Pa.

The Shop Treatment of Structural Steels. By A. F. Hill, New York City.

A Suggestive Cure for Blast-furnace Chills. By H. M. Howe, Boston.

Coal and Iron of Alabama By T. Sterry Hunt, Montreal.

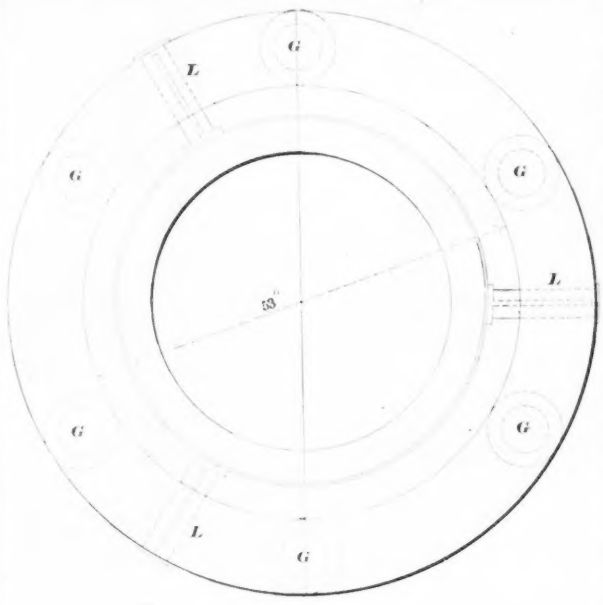
Lines of Weakness in Cylinders. By R. H. Richards, Boston.

The Strength of American Woods By S. P. Sharples, Boston.

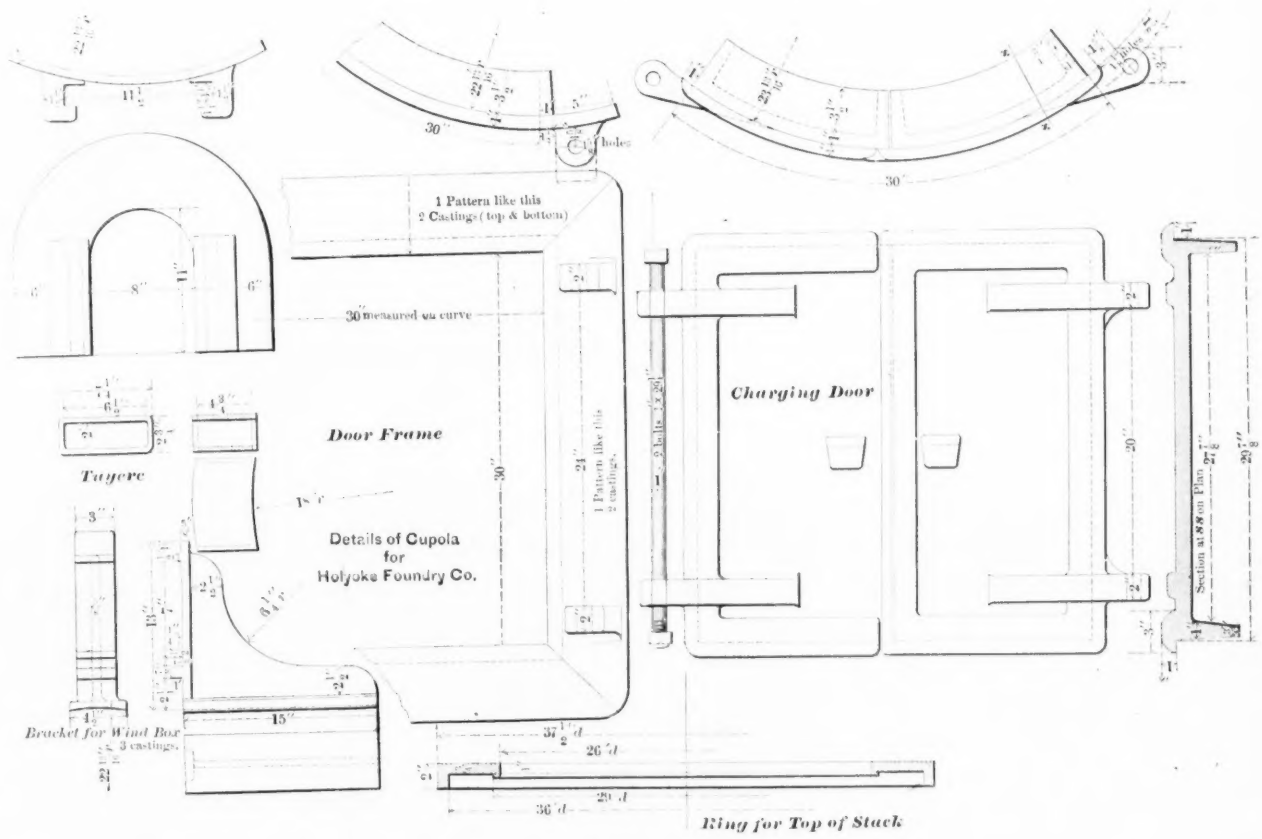
Determination of Manganese in Spiegel By G. C. Stone, Newark, N. J.

History and Statistics of the Manufacture of Coke. By J. D. Weeks, Pittsburgh, Pa.

Notes on Settling tanks in Silver Mills. By Albert Williams, Jr., Washington, D. C.

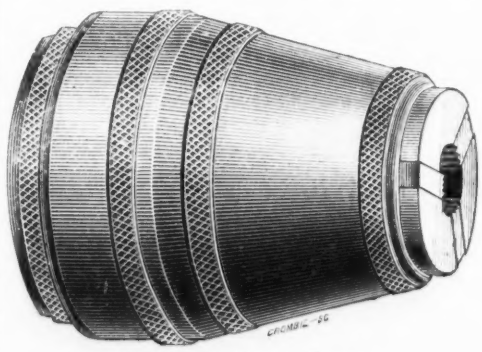


AIR BOX.

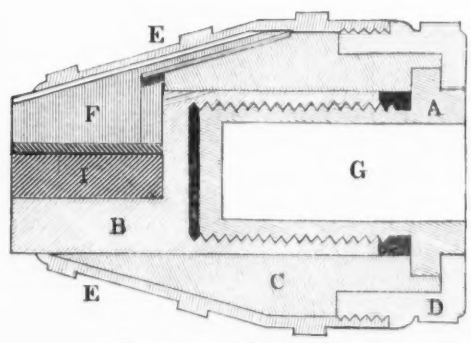


Improved Drill Chuck.

One of the most serious difficulties experienced in holding twist drills is their liability to slip. If the shank be too hard it will bruise the jaws of the chuck, thus throwing them out of truth, and in a short time it will be impossible to hold a drill so that it will run true. In the drill chuck here represented, which possesses several novel features, the jaws instead of being placed radial with the circle, occupy a tangential position, so that the jaw is always in advance of the center as the chuck rotates.



IMPROVED DRILL CHUCK.



SECTION OF DRILL CHUCK.

It will thus be seen that should there be any tendency on the part of the drill to slip, the jaws will grip it still tighter. The faces of the jaws have teeth in them, which instead of being placed parallel with the sides, are cut diagonally across (as shown at *I* in the sectional view) to increase their gripping capacity. From this view it will also be seen that the details of the chuck are very simple. The center or nipple, *A*, has a taper hole *G*, to fit the standard taper of the Morse Twist Drill Company. This center, having a thread and collar upon it, also serves to move the central cylinder, *B*. The sleeve *C*, has three recesses in it to receive the jaws, one of which is shown in section at *F*. The wings forming a part of the jaws slide up and down the sides of the cone, being guided by the slots in the center cylinder. This movement of course opens and closes the jaws. The parts of the chuck are held together by an outside casing, *E*, screwed fast to the nut *D*.

To operate this chuck requires no key or wrench. This size will hold drills of all sizes from 0 up to ½ inch in diameter.

It is made by L. B. Russell, 96½ Summer street, Boston, Mass., S. A. Smith, 154 Lake street, Chicago, being the Western agent.

It is desirable for a United States Senator to correctly inform himself in regard to simple facts about the manufacturing industries of his State before making a speech on the subject in the Senate. A few days ago Senator Miller, referring to the aggregate manufactures of New York City, said: "Yet she has not a cotton mill, a blast furnace, or a rolling mill within her borders." The Spuyten Duyvil rolling mill and the two Manhattan blast furnaces, both in New York City, have been in existence for a number of years. The mill has not run continuously, but the furnaces have been kept very active, being, in fact, among the most successful in this country.

An Incident of the Exhibition of 1851.

The following incident of the Universal Exhibition of 1851, in London, is furnished us by our correspondent, W. Dicks, of Toronto, Canada:

At the Universal Exhibition in London, in 1851, various firms from many nations exhibited their several productions, and steel files formed an interesting and extensive part of exhibits, as, no doubt, many of the readers of your paper will remember. I happened to be in the building on one occasion when a deputation of file manufacturers from various centers of the trade met (whether by invitation or accident I don't know), compared notes, and discussed matters relative to the exhibit, and extolled the superior qualities of their own products. They made the tour of inspection, met to congratulate each other, and deposited on a counter a sample, acknowledged by most of them to be equal, if not superior, to anything produced by them. So far as I could judge, they were as perfect as I could conceive, and were about receiving that verdict, when a dapper, but very polite, little Frenchman presented himself, and with a (in French) "Gentlemen, if you please, permit me," etc., produced a package of files from his pocket. They were examined and pronounced "very good." Then, again asking permission to test his with theirs, he actually filed a notch comptetely across the center of one of them, and snapped it in two with his fingers in the line of cut.

I do not remember having seen this incident in print before, but it may meet the eye of some of your readers who witnessed it.

In 1870, Georgia had 34 cotton manufacturing establishments; they employed 2,846 hands, and $3,348,265 capital, and paid $611,868 wages per year. In 1880, that State had 40 cotton manufacturing establishments, with $6,348,657 capital, and 6,340 operatives. There are now 54 cotton mills in the State, and over 10,000 operatives. This indicates a condition of things very flattering to the manufacturing interests of that section.

As an illustration of rates of wages paid under a protective tariff and under a free trade system, William Clark, Treasurer of the Clark Thread Co., gives the following schedule of the rates paid by that company at their works in Newark, N.J., and in Paisley, Scotland:

In Newark.		In Paisley, Scotland.	
Cop-winders	$8 00	Cop-winders	$3 50
Finishers	5 50	Finishers	2 20
Reelers	8 00	Reelers	4 25
Spoolers	8 00	Spoolers	3 25
Foremen	20 00	Foremen	7 00
Pickers	7 00	Pickers	4 12
Hank-winders	7 00	Hank-winders	3 75

A New High Speed Engine.

The motor illustrated on this page is a new aspirant for public favor which belongs, as will be seen, to the three-legged bifurcated type of high speed automatic cut-off steam engines.

The cylindrical form has been maintained to the back end of the slides, which are bored the same diameter, and, of course, in line with the cylinder. This gives certain alignment and great stiffness. At the back end of the slides the framing divides into two half cylinders, or rather half tubes, which terminate in the main journal bearings.

The main journal bearings are made fast to the pedestals with a self-adjusting connection, and the pedestals are bolted rigidly to the foundation.

The cylinder end is supported by a column resting on a circular plate, but is not confined in any way except by gravity. This allows a free movement of the cylinder end under expansion and contraction from change of temperature, and the stretching and compressing effect of the force of the steam acting on the piston.

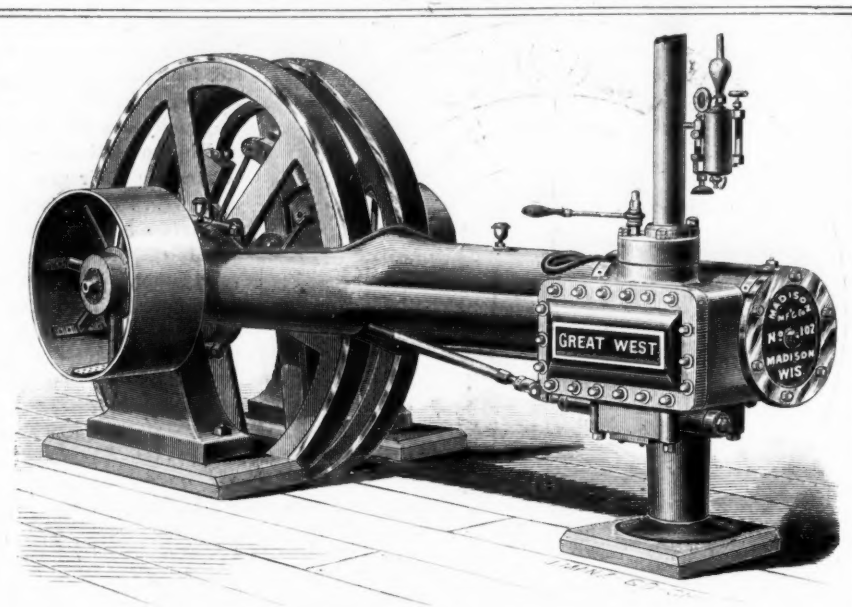
The governor is of the "fly-wheel" kind, and controls the eccentric in the usual way of such governors.

The eccentric rod approaches the valve stem at a downward angle, which arrangement maintains the lead and secures a good distribution of steam without the intervention of the usual rock arm.

It has a single slide valve, of the double-faced balanced cover plate type, which is carried between the cylinder face and cover plate in such a manner that it does not rest on its lower edge, as is the usual practice in horizontal engines of this kind, consequently it is claimed that it moves with less friction than has heretofore been attained.

Steam is admitted to the chest through a thorough-way lever valve, and is exhausted through the column upon which the cylinder rests.

The novelties are the inventions of Benj. F. Wilson, the superintendent of the Madison Manufacturing Company, who are building the engines at Madison, Wis.



A NEW HIGH-SPEED ENGINE.

A New Screw Press.

The Ferracute Machine Company, of Bridgeton, New Jersey, have lately built a screw press from new designs and patterns, embodying several novel features, which are illustrated in the annexed cut.

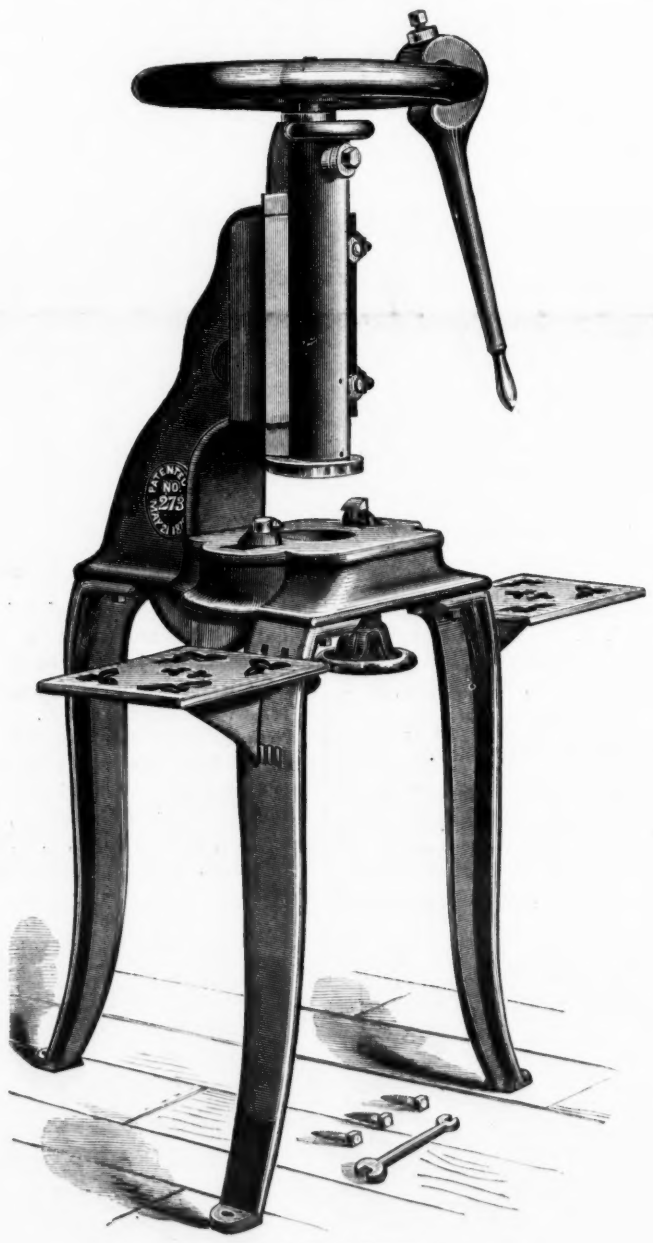
The use of presses of this kind is generally limited to punching and embossing work, although they can also be used for accurate cutting or "blanking," especially when they happen to have long slide bearings.

The hand wheel at the top of this press is keyed to a square-threaded steel screw, about two inches diameter, triple thread, and two inches pitch. This screw works in a brass nut 5½ inches long, firmly affixed in the interior of the frame, the lower end of the screw being hardened, and bearing against a hardened steel disc in the slide bar. The handle is made heavier than is necessary for strength, in order that it may add its momentum to that of the wheel. It may be adjusted at any angle from a vertical to a horizontal position, thereby varying the leverage, and at the same suiting the height of the operator. It may also be set-screwed to any part of the circumference of the wheel, giving a delicate vertical adjustment, and enabling the operator to keep his accustomed position, whatever be the height of the dies. This hand wheel is claimed to have decided advantages over the old-fashioned weighted lever, still in very common use, which always seemed to be having sinister designs on the head of the operator.

The slide bar is of dove-tail section, six inches wide, and is kept in position by an adjustable gib, firmly bolted to the frame, which is moved sidewise by set screws secured by lock nuts.

The hole through the bed is eight inches square, and over it lies a removable bolster plate, in the middle of which is a five-inch round hole. Patent differential die clamps work in slots on each side of the bed. These clamps firmly grip the lower die without the use of a wrench. Shelves for holding sheets of tin, etc., hook on the side legs.

The extreme height of the machine is five feet eight inches; distance back from center of slide bar, six inches; width between die clamps, clear, eight to eleven inches; height from bed to bottom of slide bar, 1¼ to six inches; total weight, 575 lbs.



NEW SCREW PRESS.

A remarkable accident recently happened at the car works in Adrian, Mich. As some workmen were carrying a ladle of melted iron from one building to another the handle broke, spilling the contents on the snow and causing an explosion by which two men were fatally, and others seriously injured.

The Millers' and Manufacturers' Mutual Insurance Company, of Minneapolis, Minn., issue a calender upon which is printed the following, which though especially applied to flouring mills, is equally applicable to other industrial establishments:

"About sixty per cent. of our fires coming from avoidable causes, would like to call your attention to some of them, that you may remedy the defects, if any exist with you. Broken lanterns, open lights, dirt around steam pipes, oily and dirty rags lying around, unprotected steam feeds, cheap fuel conveyors, steam pipes resting on wood, poor oils, using waste in bearings, no system governing watchmen, matches for rats to use, untidy foreman or miller, careless employes, and a dirty establishment. To mend matters, come open stairways, hatches and elevators, no iron doors or shutters to prevent spreading of fire, no barrels of water with buckets, poor hose, no sprinklers, no extinguishers, etc."

With reference to the production of steel and steel rails in this country in 1882, we clip from the *Bulletin*:

"We have received complete statistical reports from the companies owning the fourteen completed Bessemer steel works which were in operation in the United States in 1882. From these reports we learn that the quantity of Bessemer steel ingots produced in the United States last year was 1,696,450 net tons, or 1,514,687 gross tons. The increase over the production of 1881 was 10 per cent. This is a much smaller annual rate of increase than has been made for several years. The increase in the production of 1881 over that of 1880 was 28 per cent., while 1880 increased 30 per cent. over 1879. The production of Bessemer steel ingots in the last six years has been as follows, in net tons:

1877	560,587
1878	732,226
1879	928,972
1880	1,203,173
1881	1,559,157
1882	1,696,450

"The quantity of Bessemer steel rails produced in 1882 by the fourteen works above referred to was 1,334,349 net tons, or 1,191,383 gross tons. This was an increase of 6 per cent. on the production of the same works in 1881, which amounted to 1,253,129 net tons, or 1,118,865 gross tons.

"These figures do not cover the total production of steel rails in the United States, as there were some rails rolled in 1882 from imported steel blooms, and there were also some open-hearth steel rails rolled. Complete statistics of the production of those kinds of rails, however, have not yet been received; they will probably not quite reach 100,000 gross tons, making our total steel-rail production in 1882 approximate 1,300,000 gross tons, against a total in 1881 of 1,210,285 gross tons.

"The fourteen Bessemer steel works referred to above contain thirty-five converters. The Scranton Steel Company is building a two-converter plant at Scranton, Pennsylvania, which, it is expected, will be completed and will be put in operation in the spring."

A good paste for cleaning brass may be made by mixing one part oxalic acid and six parts rottenstone, with equal parts of train oil and spirits of turpentine, making a thick paste of the whole.

The formula for lining metal as used by a well-known builder of high-speed engines is as follows: Copper 11½ lbs., antimony 15½ lbs., tin 47 lbs., yellow brass 1 lb. Melt together and add 2 lbs. of tin to 1 of the above.

More than $250,000 have been subscribed towards the industrial exhibition at Louisville, Ky., without asking outside assistance. The managers say:

"Whatever ample means, earnestness and activity can do to make a great Exposition will be done, and all that the people who have thus furnished the means ask of the National Government, the States and the people of our country, is that they will give moral aid and encouragement to the enterprise, that they will bring to it exhibits of their products, their manufactures, their machinery and their arts, and that they will come in person and see this exhibition of the arts and industries of the various sections of our land."

A Moulder's Reflector.

In every thoroughly enterprising foundry, more or less inconvenience has arisen in the winter season from being obliged to take off the heat, either in the dusk and dark evenings from September to April, or at such an early and faintly lighted hour of the day as to materially shorten free, active operations, and consequently greatly lessen the amount of work produced.

Most foundry managers will at once perceive the usefulness and advantage of an invention which obviates the evil of after dark founding.

The reflector illustrated herewith has been put into use in some of the largest foundries in New England, where large quantities of small work are produced, with excellent success.

With this reflector the foundryman can draw his heat from an hour to two hours later in the day. He can also frequently save time by taking off the heat quickly and easily.

Both the arm and the eyes are protected from the heat, and the eyes from excessive light, as it shields them, and enables the moulder to get uniform, good work in the dark hours, for he can pour directly into the sprue hole and not slop the iron against the side, thereby cooling it off.

The reflector is made of heavy nickel silver and spelter, and other metal will not adhere to it. It has clamp jaws actuated by a thumb-screw, which fit any size ladle handle; also a ball and socket joint that can be adjusted to either right or left hand ladles, and in any desired position.

The reflector can be put upon the ladle and adjusted in less than one minute, and when adjusted properly, reflects the intense light from the ladle of iron directly over the ladle nose upon the sprue holes of the mould.

James D. Foot, of 101 Chambers street, New York, supplies these reflectors to foundries in all parts of the country.

Fast and Slow Moulding.

BY THOMAS D. WEST.

The moulder that produces the most work is not always the one that makes the most motions. The contrary is generally true. The man who does a large day's work, if observed, will be seen to be attentive, calm, and thoughtful, but never, apparently, in a hurry. You will never see him excited, or making a false move. If he steps across the shop to find some tool, you will generally see him bring back more than he went for. On his way he sees something that he will want further on in his job. His thoughts are on his work, and he sees ahead of what he is doing, and does not have to wait until he comes to the different parts of his job to know what he wants. Materials and tools are always waiting for him, not he for them. When he has a new job he sees its requirements before he begins it. He thinks before he acts. His brains are always ahead of his muscle, and he never makes two motions where one will do. This requires thought and study. All men are not capable of this, but many that are do not practice it. They would sooner be in a sweat than bother their brains with thought, or study how to accomplish the most work with the least labor.

Practice should always lessen labor, and with some men it does, while with others it does not. The remark is often heard of a quick workman, "He slights his work; no wonder he can do so much with such ease." In the eyes of some he is looked upon as careless, and called a "lucky" moulder. What is wanted in every foundry in the land is more of these lucky moulders; not those who, without their abilities and painstaking, try to imitate them, and are forced to the conclusion that they were not born lucky.

What is generally thoughtlessly called slighting work, is simply taking advantage of the requirements of the job. It is something that cannot be well explained, and can only be done by a master of the trade. A beginner should aim at perfection first, and when he has accomplished this as far as possible, he can practice slighting, but never at the sacrifice of perfection. Many men practice slighting and lose thereby, for the simple reason that they have not made it a study, or that they lack experience and judgment.

Slighting work does not always mean that every part of the job is to be done with less labor. Many times a little extra labor on one part will save twice as much on some other part of a job. Sometimes by a little extra care or labor in ramming up portions of a mould, a deal of labor can be saved in finishing. Many moulders waste time in the ill-use of their rammers. They ram many parts of their moulds harder than is necessary. It would be useless to attempt to describe the many ways that work can be slighted, as the class of work and general conditions must be the guide.

In foundry practice two classes of castings are produced—heavy and light. The production of each of these calls for a different class of men. With light work, the quickest-motioned men will excel. In this class of work it does not require so much practice or judgment to know what may be slighted. On light work, men are very seldom changed to different floors. They can keep their tools together and soon get the run of jobs, as one man may make a hundred pieces from one pattern during the day; while with heavy castings a man may require a month to make only one.

A foreman may successfully rush light work, but when he attempts it on heavy work he must go careful, or find himself the loser. There are times and places where the moulder's manipulations may be as rapid on heavy as on light work, but generally this can not be expected.

There are two ways of bringing about rapid work. One is the foreman's method, and the other the moulder's. If a foreman can bring influences to bear that will interest workmen in their business, it will conduce to rapid work. If, on the other hand, he contrives to make men think they are being driven, rapid and good work will not result.

It is easy to judge whether or not a workman is quick-motioned, but not so easy to gauge his mind and perception. There should be harmony between the mind and the hand.

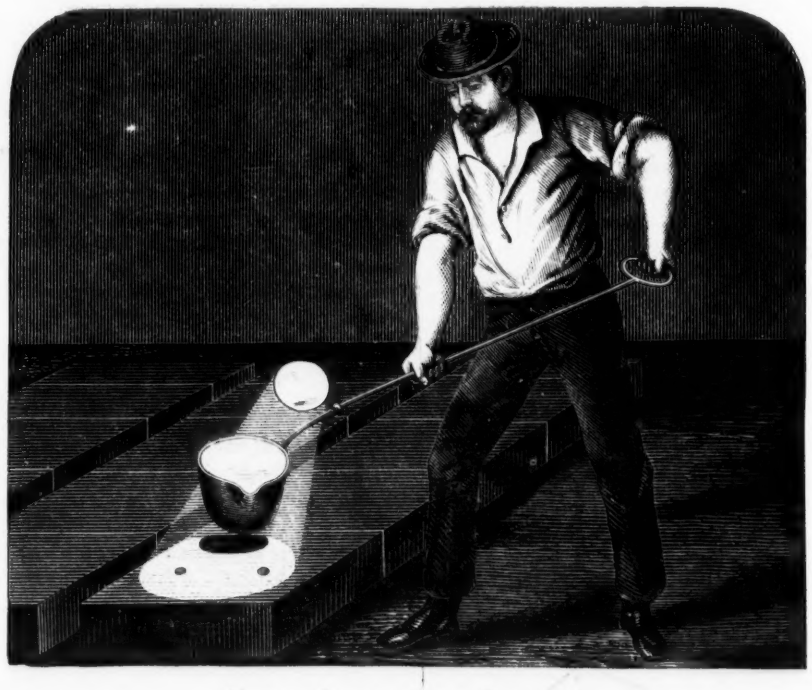
Some men can see and understand all the requirements of a new job in far less time than others. Their brain is more active, mind clearer, and perceptive qualities larger, and if combined with these the organ of caution is prominent, they should make good reliable moulders, capable of doing a large days work.

In machinery foundries many moulders are given other moulders and helpers to assist them.

To be able to keep this help employed so as to accomplish the most, and to avoid mistakes and trouble, is an accomplishment the moulder should perfect himself in, if he expects to produce castings rapidly. There are many moulders who are all right, and can do a large day's work if left to themselves, but should you wish to forward things by giving them helpers, the extra quantity produced will be but little, as they cannot tell others how to work and also work themselves.

It is uncommon to find a moulder possessed of all the desirable qualifications. He should be reliable, quick, neat, commanding and temperate; a good many virtues to find in one individual.

FOUNDRY LADLE, WITH REFLECTOR.



USING A LADLE WITH A REFLECTOR.

LETTERS FROM PRACTICAL MEN.

Cast Iron vs. Steel Lathe Tools.

Editor American Machinist:

Some months ago I saw an article in the AMERICAN MACHINIST saying that at the Altoona railroad shops they gave their men the choice between cast iron and steel tools for lathe and planer work, and that the old men took the cast tools from choice.

I knew that cast iron could be made hard enough, but supposed it would flake and crumble by the hard usage, but as the authority was so good I thought I would try it, and the result of the experiment is that I have "struck ile." For cast iron work, the tools stand far better than any steel tools that I can get—in fact I have taken steel tools that were made as hard as fire and water would make them, and found in practice that the scale on the iron would plane the edge off (as though there were no temper in the steel) in less than two minutes. Then I took the cast iron tool and used it for a half hour without grinding.

For the first tools I had made I used tolerable hard iron with light chills, but they did not stand as well as soft iron with a heavy chill.

I find some trouble to determine just the best shape in which to have the patterns made, and should be pleased to hear from those that have had more experience than I have had.

H. REYNOLDS.

Ithaca, N. Y.

Petroleum as Fuel.

Editor American Machinist:

"Coal," in your issue of February 3, instant, 1883, page 7, says: "*First*," my "arithmetic is bad." This in the article referred to I frankly admit. I would, however, under any circumstances understate rather than overrate the facts. As an evidence of this "Coal" will find, by referring to the same article that he quotes from, that I have put the cost of coal consumed on locomotives per train mile at *ten* cents, when in fact it is about *fifteen* cents.

"*Second*. Good merchantable coal, properly burned, should produce 13,000 units of heat instead of 10,000, as Mr. Le Van says." According to the report of the test of steam boilers, at the International Exhibition, 1876, at Philadelphia, with thirteen different types of boilers, the units of heat produced by the combustion of one pound of good anthracite coal averaged 10.151.

"*Third*. Any comparison of the merits of solid and liquid fuel which does not take into account the relative cost of the two fuels is useless."

"*Fourth*. As Mr. Le Van says: 'Facts outweigh the profoundest and most ingenious speculation.' The facts are that numerous experiments, made during the last twenty years, have failed to prove that there is any economy (of dollars and cents) in the use of petroleum as a fuel under steam boilers. The Standard Oil Company, who have the crude petroleum at the lowest cost, still use coal under their boilers."

Now, as to the facts in regard to the "comparison of the merits of solid and liquid fuel."

In June, 1866, Mr. C. J. Richardson, at the Woolwich dockyard, England, "made experiments with crude shale oil. The initial temperature of the water in the boiler being 140°, and 23 pounds of oil being used to raise steam to the pressure of 10 pounds per square inch. The temperature of the feed water was 64°, and during the trial, which lasted 9 hours 20 minutes, 5,500 pounds of water were evaporated by the consumption of 316 pounds of the shale oil. This gives 17.4 pounds of water evaporated by 1 pound of oil, the rate of evaporation being 9.43 cubic feet per hour, or 2.35 cubic feet per square foot of grate surface per hour." In another experiment with "Torbane Hill mineral 'once run,'" the evaporation "was 18.02 pounds per pound of oil—an extremely good result."

This experiment was made with a steam pressure of ten pounds per square inch. The total heat of steam of a pressure of 10 pounds above the atmosphere, is about 1187°, and, as the feed-water was during this last trial 70°, therefore: $1187 - 70 = 1117°$ of heat which had to be imparted to the water to cause evaporation under the given conditions. This number of degrees of heat multiplied by 18.02, the number of pounds of water evaporated, gives as follows: $18.02 \times 1117 = 20128.3$ units of heat developed by the consumption of one pound of oil.

Let us take a more convenient form of comparison, and reduce this result to the quantity which would have been evaporated under the pressure of the atmosphere from a temperature of 212° by the same amount of heat. The total heat of steam of atmospheric pressure is about 1178°, and if from this we subtract 212° there remains 966° of heat to be imparted in order to convert water at a temperature of 212° into steam of the pressure of the atmosphere,

$$\frac{20128}{966} = 20.83 \text{ pounds of water,}$$

which would have been evaporated under

the pressure of the atmosphere from a temperature of 212° by the consumption of one pound of oil.

Allowing "Coal" thirteen pounds of water to be evaporated with one pound of coal, we have a gain of

$20.83 - 13 = 7.83$ and $7.83 \div 13 = .6023 = 60.23\%$.

The result is a gain of sixty and twenty-three hundredths per cent. with crude oil over coal. Petroleum in its crude state is a compound of a spirit (called mineral naphtha, or petroleum spirit), a burning oil, and heavy petroleum. The proportions of these three elements (which may be separated by distillation), vary greatly in different samples. Some kinds evolve inflammable vapor at a low temperature, and are, consequently, readily ignited.

Within the last few years experiments have been made to produce water gas from naphtha, by what is known as the Holland Hydrogen process.

An experiment was made in a locomotive with the Holland Hydrogen process and with coal. The result was that steam was raised from cold water to 130 pounds per square inch with 25 gallons of naphtha in six minutes at a cost of 75 cents (three cents per gallon). With wood and coal, in the same locomotive, the cost was over $10 for the identical work, to wit: half a cord of hard wood, cost $3.75; a large quantity of loose pine stuff not measured, and two tons best anthracite coal, cost $10, out of which about half a ton was left after reaching the above steam pressure. Allowing half a ton of half-consumed coal left in the furnace, say one-fourth of a ton in value, the net cost was over $10, or a gain of over twelve hundred and thirty-three per cent.

$$\frac{(10.00 - 0.75) \times 100}{0.75} = 1233.33 \text{ per cent.}$$

The cost per train mile by this process is *three cents* (one gallon of naphtha), as per experiments made between Paterson and Jersey City *via* Newark Branch of the New York, Lake Erie, and Western Railroad; distance 20 miles, without the right of way. The figures regarding coal on this branch are not in my possession, but placing it at the average cost per train mile, say 15 cents, there is a gain of *four hundred per cent.*

$$\frac{(15 - 3) \times 100}{3} = 400 \text{ per cent.}$$

The fact that petroleum is not in common use as fuel for steam boilers is no argument that it is not more economical than coal. If the Standard Oil Company understood how to properly use petroleum they would no doubt find it cheaper than their present fuel.

Dr. Siemens, president of the British Association, said, in a recent lecture on waste: "The burning of raw coal for domestic purposes is very wasteful. Coal should be reduced to gas and coke. Gas can be burned more economically than coal, while coke and other so-called waste products resulting from the manufacture of gas are of more money-value than the coal originally used."

W. BARNET LE VAN.

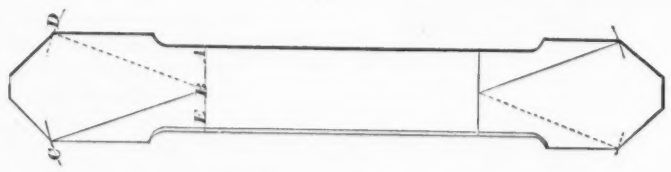
Philadelphia.

How to Grind Flat Drills Accurtaely.

Editor American Machinist:

Being a constant reader of your valuable paper, I will take the liberty to venture a small contribution for the benefit of our craft.

It is a method of accurately grinding what we term a common flat drill, used in boring. I use them very successfully in my business, and have had men spend a quarter of an hour on each drill trying to grind it so that it would bore a smooth and straight hole not larger than itself. I have seen gauges for that purpose, but they are expensive. I enclose a sketch representing my idea.



FLAT DRILL DIAGRAM.

A, is a flat drill; *E*, is a line drawn around the body of the drill, care being taken that the lines are exactly opposite each other, then a center is established, as shown at *B*. Next by using a pair of dividers, describe the arc *C*, at the lip of the drill; then turn the drill over, and insert one point of the dividers in center and describe the arc as shown at *D*. By this simple method any inexperienced apprentice can grind a drill to bore its own size. We have but few journeymen that can grind a drill accurately.

I do not claim anything for this method other than that it will save much botchwork and bushing, or spoiling work altogether.

The idea is originally my own, and if publishing it will benefit the craft, my aim is attained.

PETER SHELLENBACK.

Richmond, Ind.

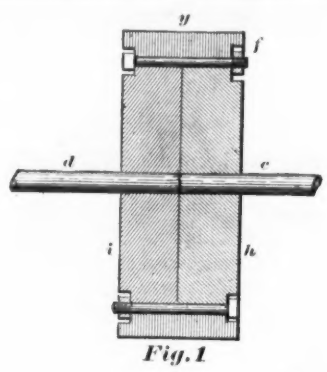


Fig. 1

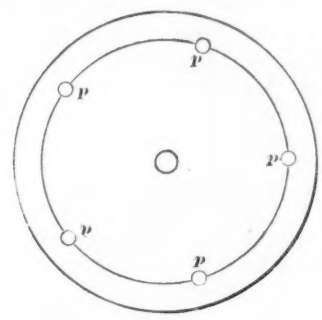


Fig. 2

SHAFT COUPLING.

A Shaft Coupling.

Editor American Machinist:

I enclose a sketch of a coupling for light shafts, which I believe is a good one for the purpose. Fig. 1 represents the coupling in section, and Fig. 2 is a plan view. In Fig. 1, *i* and *h* represent the two parts of the coupling, which are keyed respectively to the shafts *d* and *e*. To these two parts a sleeve *y* is closely fitted, and the holes *p*, (Fig. 2) are drilled for the bolts. These bolts are fitted tightly, and the heads and nuts countersunk, as shown.

The advantages of this coupling are: There are no projections to catch clothing or belts; it can be used as a pulley when desirable, and the shafts can be uncoupled without moving them endways.

HERBERT D. PENNEY.

New Gloucester, Me.

Fig. 1

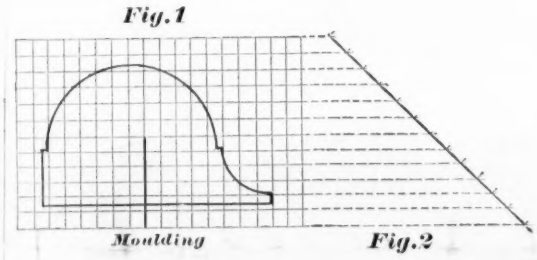
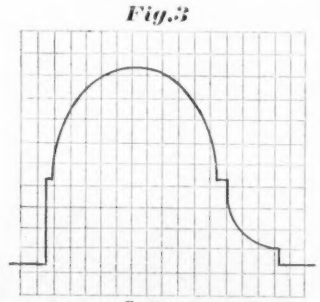


Fig. 2

Fig. 3



Making Moulding Cutters.

Editor American Machinist:

Having read the inquiry and practical letter under above head, I will try and give your readers the benefit of a way to make moulding cutters from the drawing, that I read some years ago in the *Manufacturer and Builder*.

Take the drawing of the moulding and space it evenly as in Fig. 1; draw a line at an angle of 45°; transfer the distance of the spacing to it, Fig. 2. This gives the length and divisions of the side of a new card, Fig. 3. The lines running from top to bottom will be the same distance apart on both cards. Draw the outlines of the moulding on Fig. 3, so they will cut the spacing the same as in Fig. 1. This will give the form of the cutter. As Mr. Reynolds explained, 45° is the angle of the cutter when it gives the finishing touch to the moulding.

G.

Bridgeport, Conn.

Lathe Speed Changes.

Editor American Machinist:

In a recent article on "Unequal Changes of Lathe Speeds" Mr. McConnell says: * * * "In this lathe, when a change is made to the back gears for a slower speed, the reduction is scarcely discernible without the aid of a microscope," and mentions this as a fault built into the lathe.

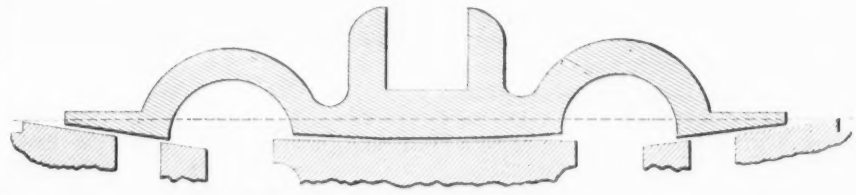
The question comes to me: is not this the best way to have a lathe? Is it not an advantage, many times, to have the speed the same whether the belt is on the largest grade of the lathe cone, without back gears, or on the smallest, with back gears in? Which ever way you have it, does not the cone pulley on the countershaft have as much to do with the ratio of speeds as anything that is "built into the lathe"?

GREASER.

Peculiar Wear of a Slide Valve.

Editor American Machinist:

I send you a full-size drawing of a slide valve and seat that I repaired a few days ago for the second time, there being only about three weeks between the time it was first repaired and the time it was returned in the condition shown. [The engraving is about ⅓ size.]



PECULIAR WEAR OF A SLIDE VALVE.

The engine is a twelve horse power, running 190 revolutions, with steam pressure 100 lbs. The engineer says he has kept the valve well oiled. I should like to ask you, or some of your readers, the cause of the rapid wear of valve and seat? It will be seen by the dotted lines that the seat has worn down about $\frac{5}{16}$ of an inch at the bridge between the exhaust and steam ports. I think the water used is muddy. Would that account for it? The engine is worked beyond its capacity, and the saw is allowed to run right along without shutting off steam. The cylinder is $8'' \times 9''$ and the valve is $7\frac{1}{2}'' \times 9''$. Is not this a large valve for the cylinder, and would the size of valve cause it to wear faster?

J. S.

Wanted a Case-Hardening Process.

Editor American Machinist:

Will some one be kind enough to inform me some way to case-harden cast iron for dies, for rolling hot steel? They require considerable work to be done upon them before they are ready for use, making it too expensive to cast in a chill.

Kingsville, O. P. J. FICKINGER.

Minor Features of Engine Lathes.

Editor American Machinist:

I would add my voice to the general demand for improvements in engine lathes. I know of a certain lathe built in the Eastern States that has been used but a little over a year. I can take hold of the tool block of that lathe and move it back and forth over an eighth of an inch, and it has been used very little for chucking. The cause is imperfect fitting of the screw to the nut. The spindle too is not round. If ground at all after turning, it was not ground properly. It also had a sort of cam arrangement on the front of carriage for locking the same when using cross feed. This device is worthless, as it soon wore out. I mention these particulars as this lathe was not sold for a cheap one.

I know of a certain shop where, out of fifteen engine lathes, which were new two years ago, there are only two that can do satisfactory work. Yet two years' careful use of a lathe is not any more than enough to bring it to a good condition for work.

I would have the cross screw nut made as long as possible, and as much pains taken with its fitting as with any part of the lathe; also some provision made for taking up the wear, and a simple and sure arrangement for locking the carriage when using cross-feed. Again, I would have the cross-screw covered at any position of tool block on the slide; also provision made to lock the tail stock by one operation. I would have some sort of a scale at joint of slide and base of tail-stock, so that if a man *must* set over the tail-stock for taper work, he can tell what he is doing. But we must not expect too much at once; these are all small things, yet I think they would be appreciated by most lathesmen.

J. E. WILSON.

Boston, Mass.

Speed in Turning Shafting.

Editor American Machinist:

A correspondent in your issue of 20th January, asks information regarding the speed of shaft turning, from $1\frac{1}{2}''$ to $3''$ diameter. In our work, with a special shafting lathe, 14" centers, 50 feet bed, running our saddle with duplex rests and a burnishing die, we regularly turn out shafting highly finished and turned to gauge, as under:

$1\frac{1}{2}''$ diam.....	18	feet per hour.
$1\frac{3}{4}''$ "	15	" "
$2''$ "	$13\frac{1}{2}$	" "
$2\frac{1}{4}''$ "	12	" "
$2\frac{1}{2}''$ "	$10\frac{1}{2}$	" "
$3''$ "	9	" "
$3\frac{1}{2}''$ "	$7\frac{1}{2}$	" "
$4''$ "	$6\frac{1}{2}$	" "

We last week turned the latter shaft, 18 feet long, in $2\frac{3}{4}$ hours, and screwed it in the same lathe, 16 feet 2" pitch, square thread, in $12\frac{1}{2}$ hours.

We could run 25 per cent. to 50 per cent. faster than these figures if nicety was unimportant.

These data may be of interest to your correspondent.

WM. SHANKS.

Thos. Shanks & Co., Johnstone, near Glasgow, Scotland.

New Chuck Rest.

For holding and properly guiding drills to drill pieces of work held in a chuck or bolted to the face plate of a lathe it requires an expenditure of considerable time and trouble in shifting tools and placing a holder in the tool post. Furthermore, these improvised tool holders are very difficult to adjust, and can hardly be placed twice alike, except with great difficulty. The Wright Machine Company of Worcester, Mass., have had a a similar experience to that alluded to, and after considerable experiment have succeeded in perfecting the very convenient chuck rest shown in the accompanying engraving, and have placed it upon the market. This device consists of the casting, *D*, made to fit upon the ways of the lathe, always being brought to a uniform position either by a groove to fit over the V, or planed to fill the opening in the bed. A bar, *P*, grips the inner edge of the bed, being attached to the casting *D*, by a bolt, so that by tightening the nut *A*, the rest is secured firmly in any desired position. The center of the drill holder is brought into line with the lathe centers by loosening the screws *B*, *B*, which allow the rest to be raised or lowered, as may be necessary. By loosening the screw *C*, the rest may be moved to the right or left, to effect an exact adjustment both horizontally and vertically.

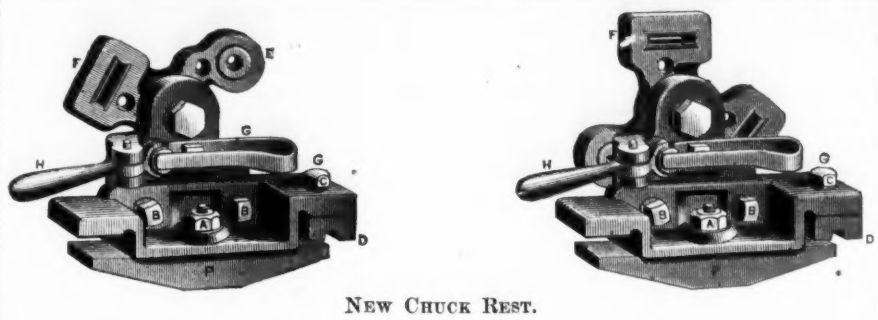
The drill holder has three arms, being pivoted by the bolt shown just above the spring *G*. Two of these arms have rectangular openings, one for thick and the other for thin flat drills. Each of these openings is lined with two hardened steel plates to prevent rapid wear, and when worn these can be easily replaced. The third arm, *E*, has a round hole for the reception of various sizes of round steel thimbles to be used in guiding twist drills, or reamears. Each of these arms can be successively thrown into position by pressing the handle *H*, which withdraws a round pin constituting the latch for holding the arms in position, after which any desired arm can be brought into position. The latch is pressed into its place by the spring *G*.

One size of this style of rest may be used for a number of lathes having approximately the same swing. Being fastened to the shears instead of the carriage much more accurate work can be done by using this rest than with the usual rest attached to the tool post; furthermore the carriage is not subjected to unnatural strains. Nearly every lathe hand has found by experience that any lost motion about the carriage, or lifting of the same, prevents the workman from drilling two holes of precise diameters, as is necessary for duplicate work.

In replacing this rest it may be brought to the same position as it formerly occupied in relation to the lathe centers, without entra trouble; in fact it would hardly be possible for it to be placed wrong.

Heckendorn & Wilhelm's Engine Lathe.

The engraving ot the eleven-inch swing and five-foot bed engine lathe shown on this page represents a new product of the machine tool works of Heckendorn & Wilhelm, Reading, Pa. It has been the aim of the builders of this machine to make it of correct proportions to operate with satisfactory results upon any job within its designated limits. The lathe swings eleven inches over the bed, and seven and a half inches over carriage, and takes three feet between centers. Its general construction may be seen by reference to the engraving. Spindles studs and actuating screws are of steel, and the small gears are made, some of steel and others of bronze. It has a hollow head-stock spindle, and the gears for screw cutting are arranged in a novel and simple way, making them easy to adjust for cutting different threads. The tool-post is also easily adjusted and at all the different gradations, forms a solid support for the tool. Sliding parts are scraped to a bearing and it is claimed the extra pains are taken with all the details of workmanship.



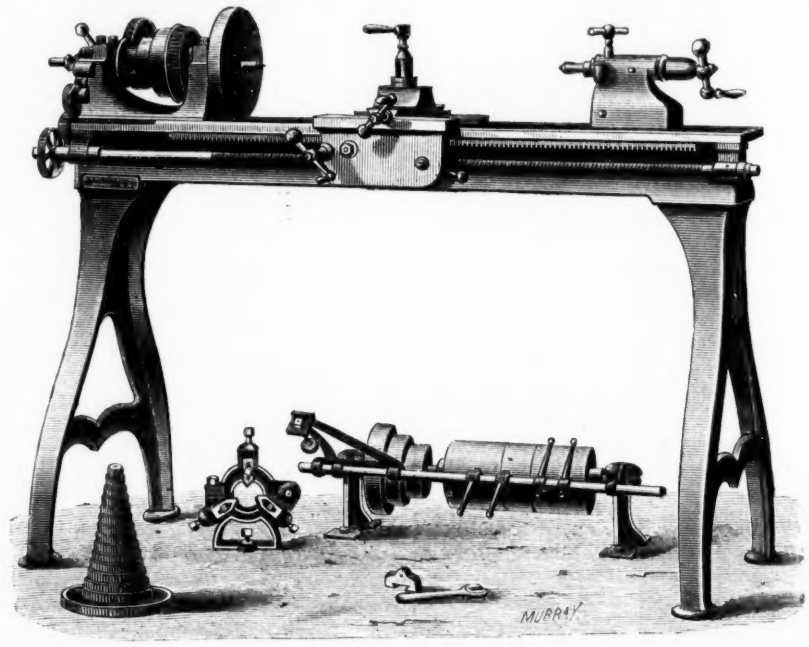
NEW CHUCK REST.

Improved Surface Gauge.

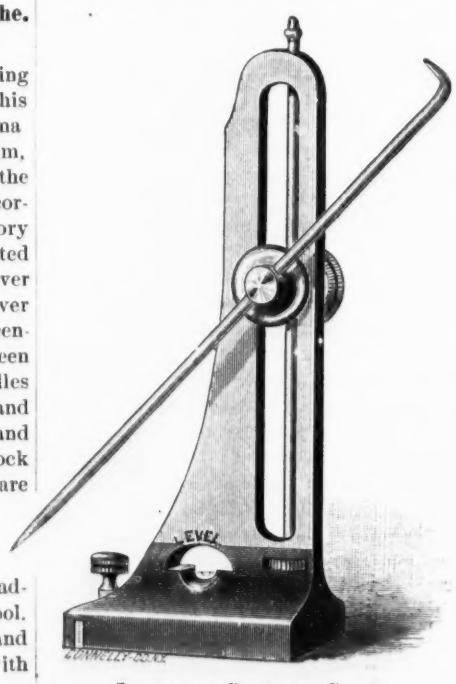
We illustrate herewith a new combined level, plumb, surface and scribe gauge. The main part of this tool is made of cast iron. Within the top of the base a spirit level has been inserted, as shown, so that when the level indicates correctly the edge of the frame may be used as a plumb.

The reader will readily see that this tool may be used not only as a plumb, but also as a square and level. The scriber is held in position by a thumb-screw. This thumb-screw clamps the scriber firmly, but allows the collars to move freely up and down in the slot without binding. A fine and accurate adjustment may be obtained by turning the small milled nut at the lower end of the little upright rod, with an acorn at the top, as seen in the engraving.

As the thumb-screw that holds the scriber also clamps the same fast to this vertical rod, any movement of the milled nut at the bottom produces a corresponding movement of the scriber. A piece of steel let into the base at the back can be thrown outward by unscrewing the milled nut shown just above the base. This projecting part is used by placing it against the edge of the platen or groove, then measuring to the work. This affords a quick and accurate means of adjustment for setting work on a line with the bed of the planer. This tool is made by the Standard Tool Co., Athol, Mass.



NEW ENGINE LATHE.



IMPROVED SURFACE GAUGE.

Man-Hole Openings in Boilers.

BY F. B. ALLEN IN THE LOCOMOTIVE.

It will we think be generally admitted that no boiler is complete without a man-hole through which admission may be had to the interior of the boiler for the purpose of examination, cleaning or repairs. In the smaller sizes where this is impracticable, there should be a number of hand-holes judiciously placed, through which the interior may be viewed, and also to facilitate removal of scales or deposit. An inportant matter too often neglected in the design and construction of boilers, is the location of the man and hand-hole openings where they will do the most good.

The best location for a man hole is on the shell of a boiler, and its strongest form is when protected by an inside frame or mouthpiece accurately fitted and securely riveted on. Where steam domes are thought to be a necessary adjunct to a boiler, a common practice is to have a cast iron dome head with a steam pipe nozzle and man-hole cast in. This is a weaker form than the one first described, for it leaves the opening in the shell beneath the dome without re-enforcement, while it is much more difficult—sometimes impossible to get inside the boiler after it is set, owing to the steam piping being in the way.

In our larger cities where ground space is limited, boilers are often placed in vaults or sub-cellars, where the overhead room is limited, which often brings the dome close up under the vault or ceiling, where it would be impossible for even the smallest child to get inside the boiler through the man-hole, owing as we have pointed out, to the contracted space and network of steam-pipes and connections. We have knowledge of cases in which it was necessary to cut away a portion of the ceiling or vault covering, sufficient to gain access to the inside of the boiler, which involved considerable expense and trouble, besides to some extent weakening the structure. The cases we have in mind were planned by architects of good repute, and the work executed under their direction. Without engineering experience they did not realize the importance of setting boilers in such a manner as to make them accessible, thus illustrating the necessity of consulting the most competent advisers in planning and executing steam engineering work. In every case there would have been no trouble in gaining access to the boiler, had the man-hole been upon the shell, instead of on the top of dome. We have always favored its location upon the shell because we believe it best for all purposes of strength and accessibility.

The horizontal tubular boiler, owing to its simplicity, compactnes, strength, and accessibility, is a great favorite among steam users, and increases in public favor every year. It admits of a variety of modifications and disposition of tubes by which it may be adapted to the wants of different localities, fuels and feed waters. To facilitate the cleaning of the sheets over the fire in localities where the feed water forms a troublesome scale or a deposit of sediment from muddy water, a clear space of ten or twelve inches is left between the bottom row of tubes and boiler bottom, and a man-hole put in the front head. In our plans and specifications this man hole opening is re-enforced by a suitable frame, same as that used on the shell. Ordinarily, manufacturers simply re-enforce it by a strengthening ring. In one case in which two new boilers were offered us for inspection and insurance there were neither strengthening ring, stays nor reinforcement of any kind, The man-hole was 10x14 inches, heads 60 inches in diameter, and the boilers were designed for a working pressure of 70 pounds per square inch.

Our inspector recommended the addition of a strengthening ring or stays, preferably the former, but the party who furnished the boilers said there was no necessity for either; he never used anything of the sort in his boilers. It may be remarked incidentally that had he deemed this alteration necessary he would have been required to do it at his own expense. The boiler in this condition of course was regarded as uninsurable.

The great advantage of properly located man and hand-hole openings are their utility. This we think is not always appreciated; sometimes they are regarded as ornamental appendages. We know of exceptional cases in which the covers had not been removed for several years; meanwhile scale or a deposit of sediment had accumulated to a dangerous extent and nearly ruined the boiler, the excuse offered by those in charge being that the joints of the plates were tight and they were afraid to take them off for fear they would leak when put back. With proper care in scraping off the old material from the face of the joint before it is remade, that is when the old gasket cannot be used over again, there should be no trouble.

Some of our friends claim that a light wash of blacklead and oil applied to the face of the gasket facilitates its removal when the joint is broken again; by this means they can use the same gasket a number of times. There are various other preparations used by engineers to accomplish the same purpose. Within a few years, special attention has been given to the manufacture of rubber gaskets for man-hole joints, that would give better satisfaction and be more durable than those heretofore used. They may be had of dealers in machinery supplies in all parts of the country.

With a suitable gasket free from gritty particles which are sometimes found adhering to it, there should be no trouble in making a tight joint at the man or hand-hole plates; if there is it indicates distortion either of the plate or its seating, in hand-holes possibly a weakness due to dangerous thinning of the shell by corrosion around the opening; in either case, the pressure should be lowered and the boiler put out of service until an inspector can be summoned to determine the cause, and make a suitable recommendation. Do not try excessive screwing up to stop the leak. That is a very dangerous plan, in which many inexperienced or reckless men have lost their lives. Tightening a joint under steam pressure is attended with great danger under any circumstances. When the joint is about the boiler it is doubly so. Under proper conditions ordinary screwing up should give a tight joint. When it does not something is wrong, and what that something is must be determined by an examination.

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NEW YORK, FEB. 24, 1883.

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An Unmistakable Public Sentiment.

The question of protection or no protection has been so vividly illustrated and discussed before the people of the United States for the last twenty years that abundant opportunities have not been wanting to learn the actual prevalent sentiment of the people upon this important industrial matter. Formerly, when most of our iron and steel was imported from England, giving employment to tens of thousands of workmen in that country to supply American demands, "the infant iron industry" was the great shibboleth of the free traders. Congress was tauntingly advised by free traders to pension off the few steel and iron manufacturers and their few hundred workmen, take off the tariff and let consumers buy iron and steel at low prices. When that infant grew strong enough to push aside the foreign article and supply the home demand without dependence upon Great Britain, thereby giving profitable employment to an army of workmen scattered throughout several different States of the Union, the free traders changed their cry to "iron and steel monopolies." Yet owing to strong competition at home, iron and steel are much cheaper than before a protective tariff was applied. The same is true of many other branches of American manufactures that have been protected by the tariff, while other manufactures not directly affected, have indirectly experienced a like assistance from the tariff. The South was formerly the vantage ground of free traders. But manufacturers of cotton goods, iron, and various other staple articles, have sprung up so widely and successfully in the South, that the people of that section are leaving free trade notions far behind them. The West, which has heretofore been relied upon to help free traders into a control of the government, has become industrially strong by the establishment of extensive manufacturing industries, and is calling loudly for a continuance of the same protective policy under which they have prospered. The prevailing sentiment of the country is unmistakably in favor of the perpetuation of a well-regulated and liberal protective tariff. Nor is it probable that this public sentiment will be any weaker when the next Congress grapples with the question.

In a recent issue the New York *Evening Post* says:

"As it is certain that agitation and business suspense will continue until a bill is passed which satisfies not the extreme ptotectionists, but a popular demand for a substantial reduction of taxes, including a liberal revision of the tariff, which is resisted by the protectionists, it is also evident that business men who want to get rid of the depressing influence of the suspense, should use their moral influence, not in encouraging the insatiable demands and pretensions of the protected interests, but in urging these protected interests to yield with good grace, and in time to what ultimately is inevitable, instead of protracting a hopeless struggle which does harm while it lasts."

Such bluster on the part of free trade agitators, fails of the purpose it is intended to compass. Threats of this kind show the desperation of the parties pecuniarily interested in breaking down a protective tariff and scare nobody who has given study and thought to the subject. The manufacturing interests of the country can not be bullied into consenting to a ruinous reduction of the tariff by any such newspaper paragraphs as the one above quoted. The struggle now going on in regard to protection can result only in the defeat of the enemies of American manufacturing industries. It may be protracted longer than has been expected, but this will only increase the discomfiture of the agitators.

Feed Pumps.

The plan of selecting a feed pump from a consideration of the capacity of the cylinder of the engine, or from the dimensions of the boiler, is not always satisfactory, because it is not generally possible to determine beforehand how much steam will be used in one, or how much water evaporated in the other. When the capacities of boilers used were more nearly alike in proportion to their heating surface, this could be done with reference to the boiler with some degree of certainty, but in present practice there is but little uniformity in this respect. If the pump is selected with reference to the water to be evaporated, it is easy to fix upon the size of pump; otherwise, perhaps as good practice as any, is to allow for ordinary land boilers, with natural draught, that the pump shall be large enough to supply not less than a cubic foot of water per hour for each 12 feet of heating surface, the capacity being sufficient to allow for 20 per cent. loss of action. Steam pumps can be run faster to meet the demands of increased work, and if a belted pump is used it is well to select one large enough to meet the requirements when running slowly, and then increase the speed if the requirements are increased. The best plan of all is to have two means of feeding the boiler, whether pumps or injectors are used, one of which should be as nearly as may be right when used constantly, while the other may be 50 per cent. larger. In fact, it is poor policy, and generally the poorest kind of economy to depend upon a single means of feeding a boiler. Boilers are sometimes burned while trying to get a pump or injector to work, or perhaps fires are hauled and work stopped, which would be avoided if a second means of feeding were at hand.

An Engineering Want.

If the builders of machines for specific purposes would accurately determine the power required to drive them, and furnish this information to the purchaser, they would not only do him a favor, but would render important assistance to the science of engineering generally. With this knowledge, the providing of the proper power for projected enterprises would be greatly simplified, fewer and less costly mistakes would be made, and a better general economy of motive power result. As it is, with the exception of a few old and prominent industries, the power required to drive the different machines, and hence the total power required for a contemplated plant is, to a great extent, a matter of conjecture, so that unless the comparison can be made with a similar establishment already in operation, the probabilities are entirely against a judicious selection in the way of an engine to furnish the power.

The steam engine builder can, of course, furnish the correct power if he knows the exact requirements, but for the best of reasons—because no one knows them—he has no data from which to work, and so cannot materially help in the matter. For this reason the size of the steam engine is hardly ever right to give the best results, sometimes being found quite too small, notwithstanding the calculations are made from the best information to be had; or the engine may be entirely too large; in either case involving an expensive change, or a constant loss that might have been avoided had the necessary information been obtainable.

Sometimes the builders of special machines or machinery, may, from interested motives, underestimate the power required, but more generally—almost always—the trouble is in the lack of knowledge on their part. Even in the instance of machine tools, where it might be supposed that reasonably exact information would be obtainable, but little that is authentic is to be had.

It is not to be expected that this information as a whole will be offered in available form, since its determination for this purpose would be expensive and somewhat tedious, but if determined by each builder, and covering such machines as he builds, it would be even better than if an attempt were made to furnish it as a whole, while the cost to any single individual or firm, would not be a matter of great consequence, and would enable him or them to furnish information of much greater private value, from a business view, than the cost of obtaining it, and incidentally of still greater value to others.

While no pains are spared to increase the efficiency of the steam engine, the furnishing of steam power as cheaply as possible being properly held as of prime importance to manufacturers, and in some respects essential to the continuance of the interests they represent, steam engines so illy adapted to their work—mainly because there are no ready means of determining beforehand what work will be required of them—as to waste two or three times over the economy gained in their construction, and paid for by the purchaser, are common.

Since the real end to be gained is not the placing of a steam engine that *would* be the most economical if the conditions under which it is working were changed to bring this about, but one that in connection with the actual conditions *will* be the most economical, it follows that any knowledge that will help in pre-determining these conditions will be especially valuable in making real motive economy available. In this way it is probable that more can be done in the direction of bringing about the economy of work done in manufacturing, by the steam engine, as compared with the cost of doing it, than will be accomplished by future refinements in the steam engine itself.

It takes, with the present knowledge—or lack of knowledge—of these things, in the majority of instances, the second generation of the steam engine to get the motive plant of a manufacturing establishment down to a reasonable condition of economy; something that, when definite knowledge of the requirements is available, is provided for in the beginning with as much certainty as anything else. The lack of the knowledge referred to represents an engineering want that ought to be filled, and from the filling of which valuable results would follow.

The Secretary of the new National Association of Stationary Engineers, A. M. Davy, Detroit, Mich., informs us that there are now fifteen local engineer societies chartered by that central organization. The whole membership is about 800. There are also some twelve or fourteen societies in process of formation in different places. Efforts are now making to start an aid department in connection with the National organization. One of the members, who leaves a wife and small children unprovided for, was recently found dead in the crank pit of his engine. After the aid department is formed, upon the death of a member a regular assessment will be levied upon each of the surviving members for the benefit of the family of the deceased. The plan of the department is a good one, and should be carried out as soon as practicable.

The State of Massachusetts has a law providing for winter evening instruction in mechanical, perspective, and architectural drawing, free, in connection with the city high schools. The winter classes in mechanical drawing in Worcester and Springfield, at least, are well taught, and seem to be quite successful.

It is quite generally conceded that there is need for extending technical education, and it is not to our credit that this need is better appreciated in other countries than it is here. What has been done in this direction already should show others what may be done.

A Sample Free Trade Argument.

"Bricklayers and carpenters get better pay than weavers and miners. We all know that. Yet the former are not mentioned in any tariff scheme, and the others are alleged to get all the benefits of protection. We pay our printers higher wages than a like number of operatives in the Harmony Mills of Cohoes ever got. Yet type-setting is not under the shadow of protection's Chinese wall, and spinning is."

It is altogether proper to discuss the relative merits of free trade and protection, but if the foregoing from the *Albany Journal*, and which is copied and favorably commented upon by the *Evening Post*, indicates the extremity to which the free traders are driven for argument their prospects of suc-

cess, in an argumentative point of view, can hardly be considered brilliant. That the *Journal*, which is a recent convert to the doctrine of free trade should be able to satisfy itself with such specious reasoning is not so strange as that the *Post*, which has so long and so ably done duty as the electric headlight of free trade, should be caught endorsing such conclusions. In fact this can hardly be accounted for on any other hypothesis than that beyond this there is nothing further—at least nothing better—to be said on that side of the question.

Bricklayers and carpenters" are better paid than "weavers and miners" for the plain reason that it requires a greater degree of skill to lay brick and to build houses than it does to weave and to mine, for which reason it is not as possible to over-supply the demand for the former as it is for the latter. This may be a good argument by which to demonstrate that, on general principles, one better be a bricklayer or a carpenter than a weaver or a miner, but when used as an argument in favor of free trade, even the most ardent free trader will have to look with the eye of faith to see its application. Moreover, all—bricklayers and carpenters, as well as weavers and miners—are better compensated here for their labor than are corresponding workers in European countries, not because some special branch of industry is protected here, but because the general policy of the Government is to afford protection to all industries.

It seems plain enough for the comprehension of anyone that it is protection in the aggregate and not in some specific direction that materially influences the wages of the worker, even in that specific direction. Why do not the *Journal* and the *Post* pursue the subject further, and show that lawyers and doctors, for instance, are better paid than bricklayers and carpenters, although neither are directly under "protection's Chinese wall?" This further consideration is needed to complete the altogether unique logic employed. If the *Journal* is interested in following its decidedly original line of inquiry, it can, without difficulty, find thousands of workmen in this country—quite a number in Albany—engaged in protected industries, and who are receiving considerable more in the way of wages than its own happy printers, but unfortunately (although perhaps it does not matter much), it would have to reverse its own peculiar logic to "point a moral" with such examples. We venture to say that those who favor protection will find room for increased encouragement the more the advocates of free trade treat their readers or hearers to such argument as that of the *Journal*.

Literary Notes.

The J. N. Mills Publishing Co., 10 Pemberton square, Boston, are preparing a Steam Users' Business Directory for the New England States, giving the name, business, location and number of boilers in use in the various establishments throughout that section. This proposed work is meeting with approval from all classes of manufacturers of steam specialties and steam boiler appliances. Enterprising dealers and manufacturers will doubtless find it valuable for reference.

The *Music Trade Free Press* is a new and lively journal, devoted to the music trade. Its editor and proprietor is W. E. Nickerson—a gentleman thoroughly acquainted with the trade he has undertaken to represent. Among the permanent headings in the neatly-printed copy before us, we notice "New Music," "Kindred Trades," "Live Matters," "Pipe Organ Trade," and "Trade Bulletin." The office of publication is 141 East Eighth street, New York, and the subscription price $2 a year.

USEFUL HINTS ON STEAM, by E. E. Roberts, manufacturer of engines and boilers, 107 Liberty street, New York, is a neatly printed and well written pamphlet of about 90 pages. It would be cheap at 50 cents a copy for study and reference by stationary engineers, but the author announces that it is for gratuitous distribution. In the preface he says: "My object in issuing this pamphlet is an entirely selfish one, inasmuch as it is issued with the hope that it will enlarge my business by dispelling some of the mystery surrounding the steam engine in the public mind, and thereby induce many to purchase machinery from me who would otherwise creep along in the old-fashioned way without it." As not over a dozen pages are devoted to advertising, and these in the last part of the pamphlet, it is of quite a different character from a catalogue of boilers and machinery with a few "hints" thrown in regarding their use. Among the topics treated we notice: Steam, scale, removing scale, blowing off, types of boilers, blister, effect of pressure, correct firing, steam domes, grate bars, chimneys, evaporation, cleaning fires, to calculate the power of a boiler, the steam engine, the frame, the piston, the slide valve, lap, cylinder condensation, steam engine indicator, the horse power of an engine, and many others of like nature. To each of our readers specially interested in steam machinery we say—send for a copy of Mr. Roberts' pamphlet and don't forget to enclose a two-cent stamp for the postage upon it.

QUESTIONS & ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

(78) Apprentice, St. John, N. B,, asks: Can you give me a rule for calculating the gearing to cut a screw on a lathe? *A.*—See "Screw Cutting on the Engine Lathe," in the AMERICAN MACHINIST of Aug. 13 and 20, and Oct. 15, 1881.

(79) A. H. G., St. Louis, Mo., asks; Will it be safe to fill a boiler to the second gauge and use it for heating; will it be safe to use the water over and over? *A.*—This is continually being done in boilers for heating, in which it is only necessary to add a little water once in a month or so.

(80) N. W. G., Hot Springs, Ark., asks: What is the height of the East River bridge, also of the bridge over the Kentucky River on the line of the Cincinnati Southern railroad? *A.*—Height of the East River Bridge, 135 feet. We do not know the height of the other bridge named.

(81) A. F. G , St. Louis, Mo., writes: In a non-condensing engine 16"x24"; boiler pressure, 50 lbs., engine running 150 revolutions, cut-off at ½ stroke, I make the horse power 103, deducting 25 per cent for friction. Am I right, and what is the mean effective pressure? *A.*—Mean effective pressure 40 lbs; power, making no allowance for piston rod, clearance, or loss of any kind, and deducting 25 per cent, 109 horse power.

(82) H. M. C., San Francisco, Cal., asks: What is meant by curves of certain degrees, and has it any reference to the radius? *A.*—Every circle is supposed to be divided into 360 degrees, and when a curve of so many degrees is spoken of it is intended to represent the number of these degrees embraced in the curve. A curve of 90 degrees embraces one quarter of the entire circle, etc. The curve may be of any radius, as 1 foot or 1 mile.

(83) C. H. B,, Waverly, Md., writes: We have a slide valve engine 7¼"×14", running 130 revolutions, with 70 lbs. boiler pressure. When all the work is on the engine is doing all it is capable of doing. Would it be more economical to use an engine of the same make, say 10"×18", to do the same work? *A.*—The amount of coal required to do the same work with both engines in equally good condition would probably be greater with the larger engine. The larger engine should govern better with the heavy load, and would not be strained so much, nor perhaps so liable to break down. If the larger engine were provided with a cut-off it should do the work with better economy in the use of steam than the small one.

(84) Constant Reader, Meadville, Pa., writes: I have a tubular boiler 60" diameter, containing 84 tubes 3" diameter, 14 feet long. The heads are braced by four stay rods 1" diameter at centre, 1¼" diameter at each end, and 14' long, which are screwed into each head and riveted. Would the heads of this boiler resist a greater pressure had there been nine 1¼" crowfoot end braces at each end, riveted to shell and heads with two ⅞" rivets, braces to reach to second course of shell of boiler, making them about 6 feet long. In other words will a straight stay rod resist a greater strain than a crowfoot brace? *A.*—A straight stay rod will resist strain better than an angular rod, but in one instance you have 4 rods 1" in diameter, and in the other 9 rods 1¼" diameter. The crowfoot braces will make the strongest job.

BUSINESS SPECIALS.

Transient Advertisements, 50 cts. a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass.

Portable Forges, $10. Holt M'f'g Co., Cleveland, O.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N.J

James W. See, Consulting Engineer, Hamilton, O.

Lyman's Decimal Table. Price 10 cents. Address, Edward Lyman, C.E., New Haven, Conn.

Mechanical Engineer. Complete motive power outfits a specialty. Peter Banta. Cold Spring, N Y.

Latest and best books on Steam Engineering. Send stamp for Catalogue. F. Keppy, Bridgeport, Ct.

J. C. Hoadley, Engineer and Expert, 28 State St., Room 28, Boston, Mass.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Wood Engraving done in best manner. Designs furnished. Edward Sears, 48 Beekman St. New York

Foot Power Machinery, for workshop use, sent on trial if desired. W.F. & John Barnes, Rockford, Ill.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York.

For sale, 25" lathes of best designs from new patterns. George A. Ohl & Co., E. Newark, N. J.

Chas. T. Porter, Mechanical Engineer, Tribune Building, (Room 42,) New York City.

Universal grinders for lathe-centers, chucks, angles or cylinders. C.C. Hill, room 8, Uhlich Block, Chicago

Machine designing and general engineering work. T. J. Wmans, 54 M. & E. R. R. Av., Newark, N. J.

A handsome monthly journal sent free to engineers and mechanics the year round. Send postal for it to Money Saver, 95 Liberty street, New York.

Steel Forgings, either plain or crank, up to 10,000 lbs. in weight. Address, Pennsylvania Steel Co., 160 Broadway, New York.

Light and fine interchangeable machinery to order. Foot and power lathes, slide rests, &c. Catalogue for stamp. Edwd. O. Chase, Newark, N.J.

Pattern Maker's Assistant. By Joshua Rose. 324 pages, $2.50 by mail, postpaid. Address orders, P. O. box 3,306, New York City.

Boring Bars made all sizes for all purposes to bore both straight and taper work. Pedrick & Ayer, proprietors, L. B. Flanders' Machine Works, 1025 Hamilton street, Philadelphia, Pa.

"Patent Binder" for the AMERICAN MACHINIST holds 52 weekly issues in good shape. Sent to any address by mail for one dollar. American Machinist Publishing Co., 96 Fulton street, New York.

Free—"Useful Hints on Steam." A book of 96 pages, illustrated. Valuable to engineers, steam users and those about purchasing steam machinery. By mail, 15 cents, or free on personal application. E. E. Roberts, 107 Liberty St., New York City.

To Manufacturers of Steam Goods and Specialties. We publish as a supplement to The Steam Users' Business Directory for the New England States, 25,000 pamphlets of "Useful Information for Steam Users," containing rules for engineers, and valuable data for all interested in steam. We guarantee to distribute these pamphlets free to superintendents of mills, mill owners, engineers, and steam users generally. Advertisers desiring to reach this class of trade, should send for our descriptive circular. The J. N. Mills Pub. Co., 165 Broadway, New York.

MANUFACTURES.

Five cotton mills at Augusta, Ga., have stopped work on account of high water.

It is estimated that from 2,000 to 3,000 Paterson (N. J.) silk operatives are idle.

The nail mill of the Calumet Iron and Steel Company, Chicago, Ill., recently burned, is rebuilding at an expense of $200,000.

The Standard Iron Mill, at Martin's Ferry, O., is rapidly approaching completion, and work will be commenced in time to secure the spring trade.

At Jonesboro, Ala., the site has been selected for one of the largest iron and coal enterprises in the State, and the plans are prepared already. It will be of the same order and dimensions as the Lucy and Isabella furnaces, of Pittsburgh.

The Chrome Steel Works, Brooklyn, N. Y., are now working a full force of 100 men. Owing to the increasing demand for their steel, they have been compelled to put in a new 100-horse power engine, making two engines now in operation.

The Wheeler Iron Company have removed their chain works from Cuyahoga Falls, Ohio, to West Middlesex, Pa., where they make all sizes and styles of chain, from 3-16 up to to 2 inches. They have facilities for making 5 tons of chains per day.

Frank H. Moulton, one of the proprietors of the Gilford Hosiery Mills, at Laconia, N. H., has been prospecting in Columbia, S. C., with a view of establishing a hosiery factory in that city. If he concludes to build a factory, he will invest at least $25,000 to begin with.

Books of subscription have been opened for the purpose of starting a cotton factory at Florence, South Carolina. It is reported that Darlington and Marion counties have subscribed $100,000, which will be largely increased by subscriptions from Charleston, other parts of the State, and North.

Ground for the new rolling mill at Ironton, O., will be broken about March 1st. The following are the directors of the new company: W. D. Kelly, Lindsey, Ironton A. Kelly and John Campbell, of Ironton; B. S Brown, of Brown, Hinman & Company, agricultural implements, Columbus, O.; Charles Parrott, of the plow works, Dayton, O., and W. W. Franklin, Columbus.

The Joliet, Ill, steel mills will remain closed until the first of April.

James Mahoney, 73 Astor House, New York, recently sent some of his patent furnaces to a sugar plantation in Cuba, to burn wet bagasse. The parties using it have written him that the furnace "works splendidly and gives great satisfaction."

F. C. & A. E. Rowland, New Haven, Conn., are building a 40x64 ft. three story addition to their machine shop, a 30x54 ft. erecting shop, a 27x30 ft. blacksmith shop and a 16x35 ft. office. The upper part of the latter is used as a drawing room. Orders for machine tools are good.

The Otley Mfg. Co., room 95, Ashland Block, Chicago, are manufacturing a steam packing cement for use in making steam, water and blast furnace joints without rubber, red or white lead, copper, hemp or sheet lead gaskets.

The Mason Machine Works, of Taunton, Mass. are just completing a large addition to their locomotive department, which is being supplied with the most modern and best machinery. When this is finished their capacity for this kind of work will be greater than ever before. The dimensions of these additions are: Boiler shop, 144x98; locomotive shop, 320x76, with a lean-to additional of 146x22.

The Cleveland (O.) Twist Drill Company are full of orders. December and January they did the largest business of any two months since the establishment started. They have added to their plant four Pratt & Whitney lathes within sixty days, and are having some special turning lathes built in Cleveland. They are constantly adding milling machines of their own manufacture to the plant.

The Crowell Manufacturing Company, of Greencastle, Pa., which was incorporated in December, with a capital of $140,000, to continue the well-known manufacturing business of Crowell & Co., established many years ago, will hereafter, in addition to the agricultural implements formerly made, engage in the manufacture of steam engines, saw mills and other machinery.—*Baltimore Manufacturers' Gazette.*

A. Allen, 109 Liberty street, New York, has just received an order for one of the Korting Double Tube Injectors, to feed a series of Babcox & Wilcox boilers of 1,000 horse power. The capacity of the injector will be 6300 gallons per hour. This is believed to be the first instance where such a large injector was ever furnished for feeding stationary boilers. The injector is for the Solvay Process Co., Syracuse, New York.

The Asheroft Mfg. Co., 111 Liberty street, New York, informs us that they have recently sold Tabor Indicators to the following individuals and firms, viz,: Jewell Milling Co., Brooklyn, N. Y., two; Wm. E. Hooper & Co., Baltimore, Md., two; Wardell & Hinckley, engineers, Chicago, Ill., one; W. & A. Fletcher, engine builders, New York, one; Elgin National Watch Co., Elgin, Ill., one; W. W. Graham & Co., Boston, Mass., one.

Robert W. Gardner, Quincy, Ill, writes us: Notwithstanding the lull apparent in general business, I am being pushed with orders beyond all precedent for this season of the year. Have just shipped four 8" governors with angle valves, to Dubuque, Iowa. Have orders booked for large size governors for Wheeling, Pittsburgh and other places too numerous to mention. From present appearances the increase in business will be greater than ever before, for the year 1883.

The National Manufacturing Company, of St. Louis, Mo., made an assignment on the eighth of last month for their creditors. The company was organized several years ago, and manufactured special machinery, such as dies, punches, models, moulds, milling machinery, etc. The company's works are now idle, and if started up again will be known by some other name, the old company having passed out of existence.

The Williams Manufacturing Company is the firm name of a new stock company which will be organized in Taunton, Mass., with a capital stock of $200,000, for the manufacture of twist drills, awls, bodkins, etc. The old firm of Williams & Godfrey dissolved Tuesday. All the stockholders of the new company belong in Boston and New Bedford. H. A. Williams started this business five years ago with three hands, and now has about seventy.—*Manufacturers' Gazette.*

A correspondent of the New Orleans *Times-Democrat* writing of the Marshall (Texas) Car Foundry Company, says: "This is the most extensive manufacturing enterprise in this part of the State, and was incorporated in 1880, being the successor of the Marshall Manufacturing Company, which was established in 1875. The foundry manufactures car wheels and all kinds of railroad castings, which are produced from Texas iron, this metal being superior to most of the iron found in the Southwest for that purpose. The company also manufacture freight cars, their work in both cars and car wheels being almost exclusively for the Texas & Pacific Railroad and the International & Great Northern Railroad. The foundry and shops were started seven years ago, with a capital of only $10,000, and the enterprise has prospered so rapidly that it now has an invested capital of $140,000. They will soon erect a large blast furnace at a cost of $50,000, and turn out their own pig iron from native ores. The company manufacture an average of 800 car wheels per month, and employ in their busy season upward of 360 workmen in their foundry, machinery and car departments.

The Edge Tool Company, at Bedford, Canada, will commence operations as soon as $100,000 has been subscribed; $49,000 have already been promised.

Haggart Bros., manufacturers of agricultural machinery, Brompton, Canada, intend moving to Toronto. They are looking for a site whereon to build. At present they have in their employ over 500 men.

The Terrill (Texas) Manufacturing Company sent Gov. Roberts a beautiful piece of woolen checked goods, made by the company, as a New Year's present. It is the first checked goods ever manufactured in Texas.

A new cotton factory is projected at Florence, S. C., and $100,000 towards it has already been pledged, and it is believed that this sum will be largely increased by subscriptions from other parts of the State and the North.

Crawford & McCrimmon, Brazil, Ind., write us. We are now finishing the last one of three engines; a 28'x36" vertical for the Central Iron and Steel Co., of this place, and will ship three engines and hoisting gear this month to the Coosa Furnace Co., Gadsden, Ala., also a hoisting rig to an adjoining county. We have had no lack of business since the middle of 1881, at which time we moved into our new shops. We have already accomplished more that we did in ten years in the old ones. It pays. We are getting out a "daisy" of a new slide valve engine to be entitled the "Consolidation," combining many of the best features of all engines and some new ones. We are having a good run on our "Deluge" boiler feed pump. We employ 25 to 30 men. Our business is increasing and the prospect for this year, with us, is better than ever.

Machinists' and Engineers' Supplies.

NEW YORK, Feb. 8, 1883.

The bad weather which has prevailed for the past few days has had the effect of depressing the supply market somewhat.

The increased inquiry, accompanied by numerous small orders, reported last week, we hoped would continue, but now the indications are that there will be a late spring trade. If our representatives at Washington would close up their deliberations upon the tariff, there would be no delay in the revival of business, but now every one seems to be unwilling to manifest sufficient confidence in the future to induce buyers generally to place their orders.

Wrought Iron Pipe is now quoted at 70 per cent. to 75 per cent. discount from list, being weaker than for some time past.

The Billings & Spencer Company, Hartford, Conn., have just issued a new illustrated catalogue and price list, of 48 pages, containing engravings of drop forgings, and other specialties. Their capacity in the direction of variety has thus far been upwards of 2,000 different articles for guns, pistols, sewing machines, special machinery, and machinists' tools. The pamphlet is well indexed.

Iron and Metal Review.

Nothing new has appeared in the Pig Iron market since our last report, and prices continue to favor the buyer. Orders continue small, and are for prompt delivery. Some of the dealers are holding standard brands in consequence of a rumor afloat that the tariff uncertainties will soon be disposed of. Some claim that considerable inquiry exists with a view of placing large orders, but these reports lack sufficient confirmation to prove their existence.

We quote Foundry, No. 1, $24.50 to $25. Foundry No. 2, X $22.50 to $23. Grey Forge, $19 to $20.

The stock of Foreign Iron in store is gradually increasing, and the supply is considerably in excess of the demand, notwithstanding the concessions offered by dealers.

We quote Coltness at $25 to $25.50; Glengarnock, $22.25 to $22.50; Gartsherrie, $24.50 to $25; Summerlee, $24 to $24.50; Carnbroe, $22; Eglinton, $21 to $21.50; Langloan, $25.50.

Wrought Iron Scrap continues dull with small sales. Prime, selected from yard, can be bought for $27, and ex-ship at $24.50 to $25.

Iron and Steel Rails continue quiet. The quotations for Steel Rails at mill are $40, and the mills have orders ahead sufficient to keep them busy for several months.

Old Rails are quiet and prices easier, which we quote at $27 for Double Heads, and $23 to $24 for Tees.

Copper is in light demand, without any quotable change, Lake Ingot being sold at 18c.

Banca Tin, 22¼c to 22⅝c.; Straits and Malacca, 21¼c.; Billiton and Australian, 21⅛c.; English Lamb and Flag, also English Refined, 22¼c.; Spelter, Common Domestic, 4.65c. to 4¾c.; Refined, 8c. to 8¼c; Silesian, 5c. to 5¼c.; Lead, 4⅝c. to 4.70c.; Refined, 4¾.; Antimony, Hallett's, 10¼c. to 10¾c.; Cookson's, 11c. to 11¼c.

WANTED

"Situation and Help" Advertisements, 30 cents for each seven words (one line) each insertion. Copy should be sent to reach us not later than Thursday morning for the ensuing week's issue.

Situation Wanted by a mechanic well experienced on Hydraulic Work. Address, J. E. Barrett, 931 Spruce St., Wilmington, Del.

Wanted—Position as Mechanical Draughtsman. Married man; three years' experience. Address, BOX 7, AMERICAN MACHINIST.

Job wanted by first-class pattern maker, near New York City. Address, Pattern Maker, Box 379, South Norwalk, Conn.

Wanted—A competent salesman for a well known first-class steam engine. Address, with reference, B., this office.

Wanted—Situation by a practical foundryman as Foreman. Has had long experience in all branches, and in handling men. Address, "Foundryman," this office.

Wanted—Situation as machinery pattern-maker or designer. Send business card, state wages paid good workmen, cost of board and probable length of employment. P. Maker, Box 191, Auburn, Me.

Wanted—A man thoroughly competent to take charge of our cost and time accounts. Must have had experience in large shops. Address, with reference, the Hartford Engineering Co., Hartford, Ct.

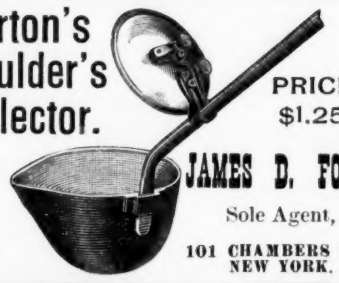
Wanted—An A1 city and suburban salesman on steam attachments, must be well recommended and prepared to make a week's trial on commission, liberal salary added afterward. Address, Salary & Commission, AMERICAN MACHINIST.

A first-class experienced mechanical draughtsman with best references, desires a position with leading firm. No objection to go out of the city. Address, D, BOX 1, Care AMERICAN MACHINIST, N.Y.

Experienced mechanical engineer, draughtsman, tool maker and machinist, competent to manage foundry and machine shop, on machinist's tools, steam engine, agricultural, electrical sewing work, etc., or in manufacture of interchangeable parts with ready methods of getting out work quickly and cheaply, on large or small work, special or intricate machinery, is open for engagement. Address, M. E., 705 Summit avenue, Jersey City, N. J.

Wanted—An experienced draughtsman, who must be a graduate of Polytechnic School with considerable experience in actual practice. To be employed under Mr. A. H. Emery in designing and constructing the Emery scales, gauges and testing machines. All applications must be by letter only, stating age, experience, references and compensation expected. Personal interviews will be appointed later. Address, the Yale Lock Mfg. Co., Stamford, Conn.

Morton's Moulder's Reflector.



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No key or Wrench required.

Holds from 0 2-8 and 0 1-2.

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S. A. SMITH, Agent for the West, 154 LAKE STREET, CHICAGO, ILL.

COOKE & CO., DEALERS IN Machinery & Supplies, 12 CORTLANDT ST., NEW YORK.

AGENTS FOR THE Greenfield Vertical Engines 2½ to 30 Horse Power.

Unequalled in workmanship and quality of material. Prices lower than any other first-class engine.

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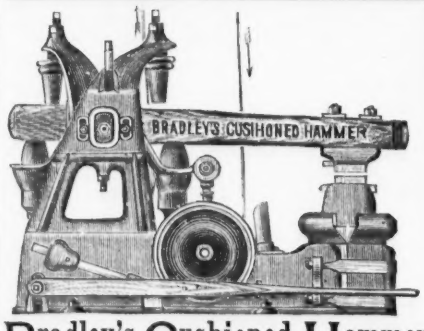

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Stands to-day WITHOUT AN EQUAL.

OVER 700 IN USE.

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ESTABLISHED IN 1832.

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Noiseless Drafer Combs, (Cotton and Woolen.)

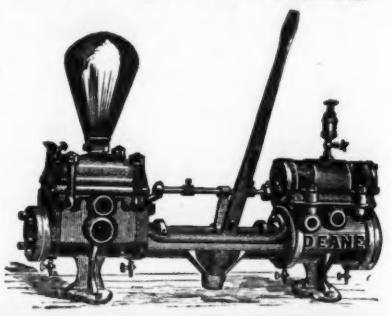
AND POWER ELEVATORS.

"THE DEANE" STEAM PUMPS FOR EVERY SERVICE.

Send for New Illustrated Catalogue.

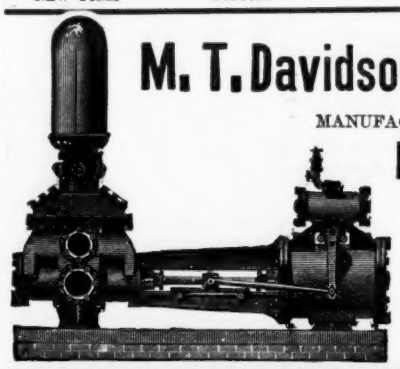
The Deane Steam Pump Co. HOLYOKE, MASS.

92 & 94 Liberty St., NEW YORK. 54 Oliver St., BOSTON. 226 & 228 Lake St., CHICAGO.



THE M. T. Davidson Improved Steam Pump,

MANUFACTURED BY Davidson Steam Pump Co., OFFICE & WORKS: 41 to 47 KEAP STREET, BROOKLYN, N. Y.



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Britannia Ware "	Millwrights.
Bronzed Goods "	Plumbers.
Car Wheel "	Plumbers' Supplies.
Chain "	R. R. Supplies.
Cutlery "	Rolling Mills.
Coppersmiths.	Safe Manufacturers.
Engine Builders.	Screw "
Fire Arm Manufacturers	Steam Fitters.
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Hardware "	Sheet Iron Workers.
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Mailed on receipt of Price, $3.00.

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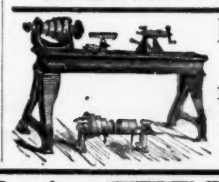

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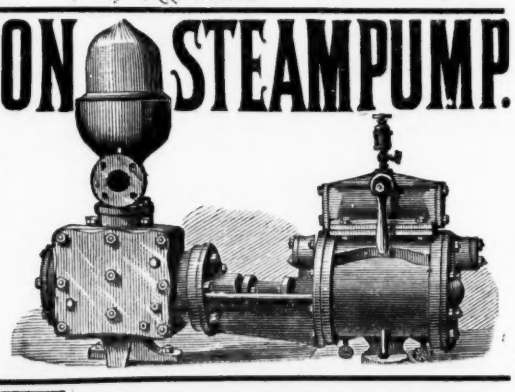

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SCROLL SAWS! The "CHALLENGE" and "RIVAL" are the finest Foot power Scroll Saws in the world, with or without Lathe attachment. Price, $10 to $25. New Catalogue free. Address, SENECA MANUFACTURING CO., Seneca Falls, N. Y., U. S. A.

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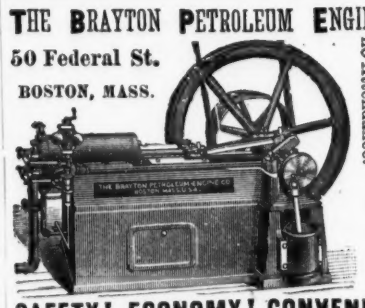

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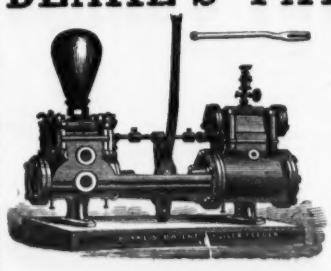

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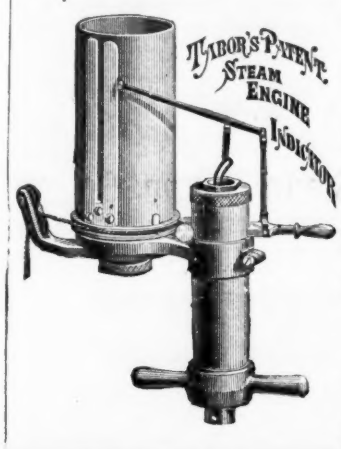

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Indicating High Speed Engines and Locomotives.

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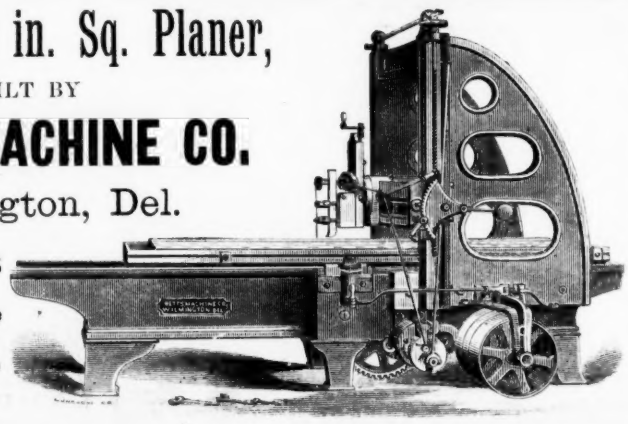

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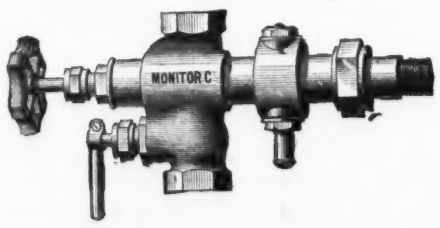

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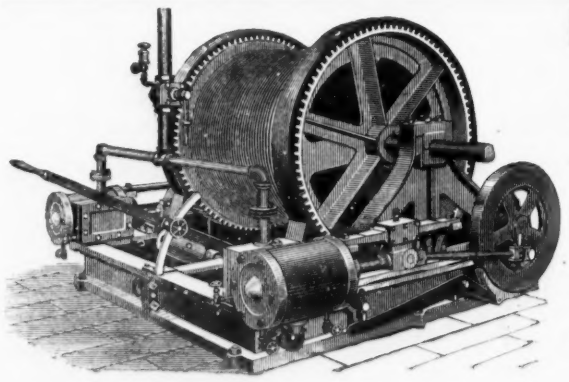

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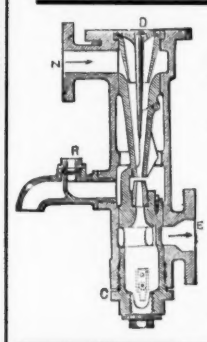

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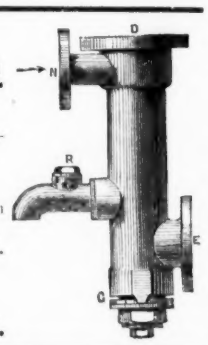

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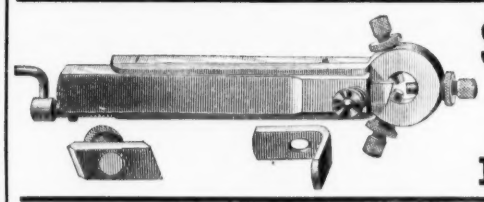

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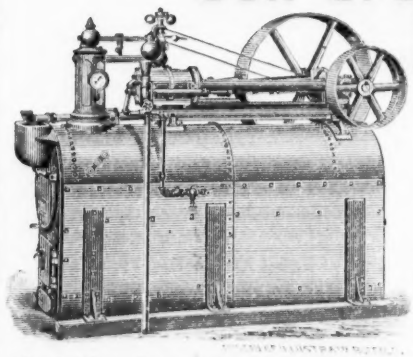

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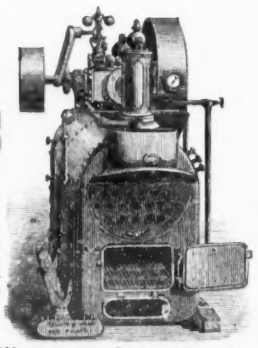

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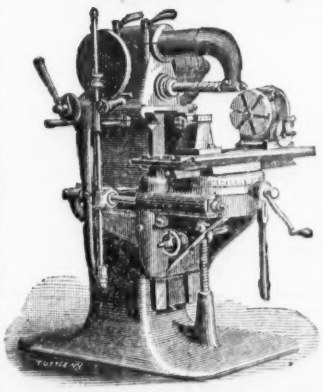

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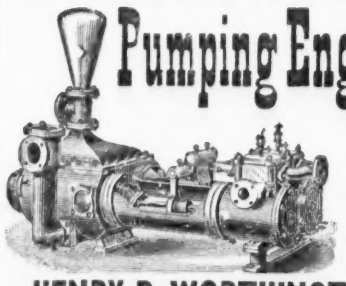

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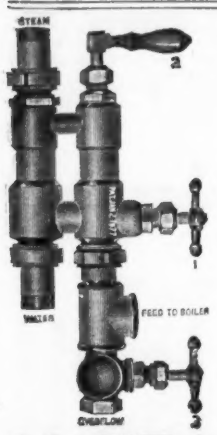

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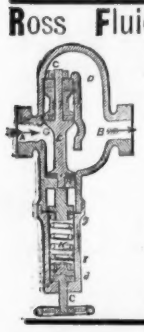

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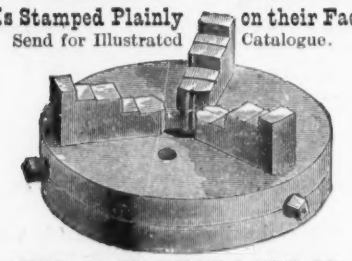

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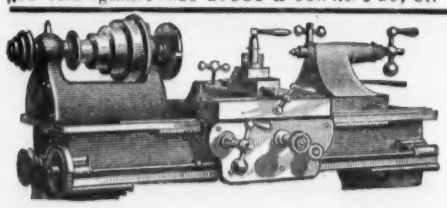

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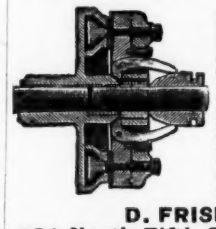

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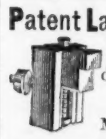

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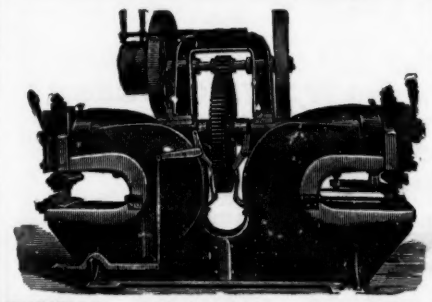

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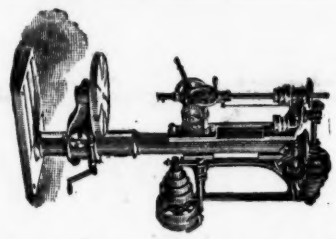

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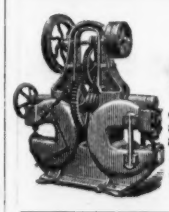

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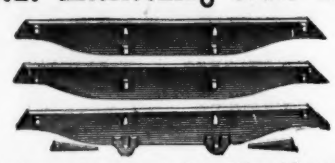

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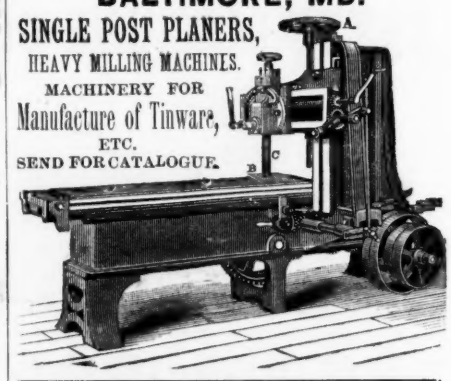

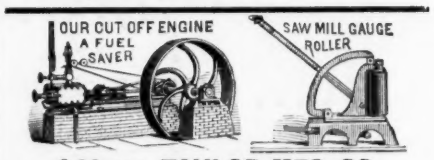

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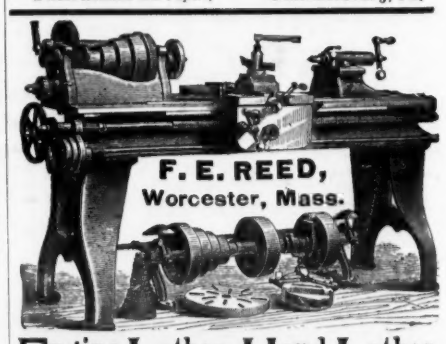

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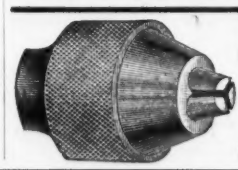

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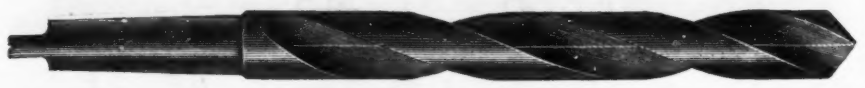

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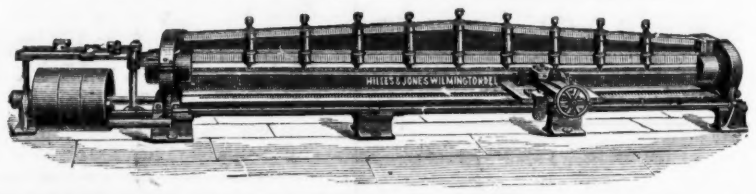

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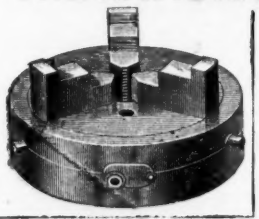

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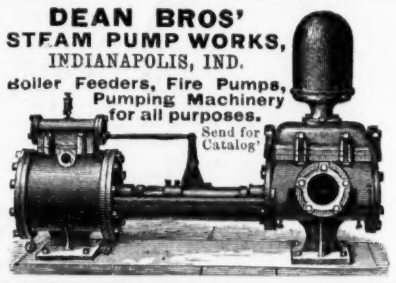

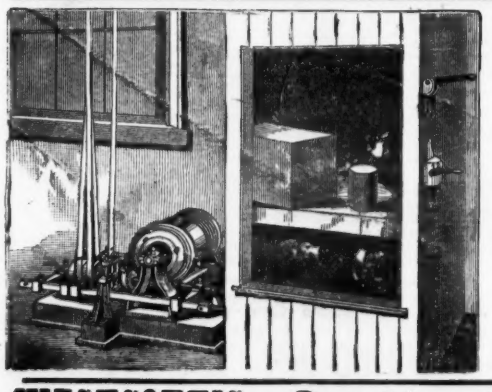

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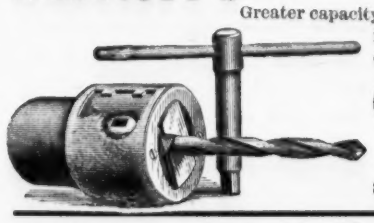

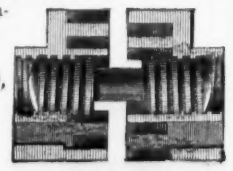

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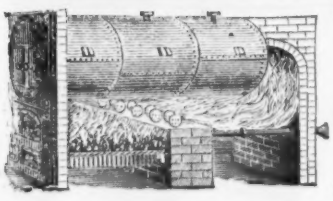

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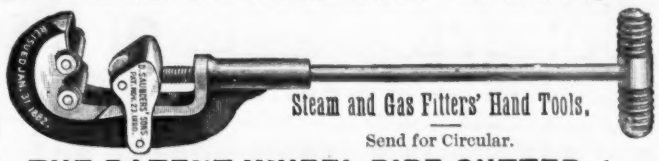

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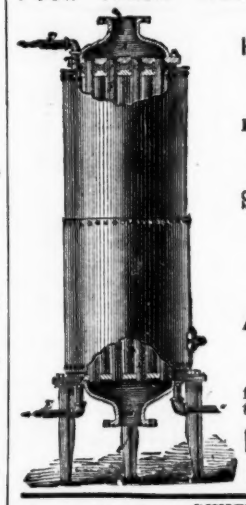

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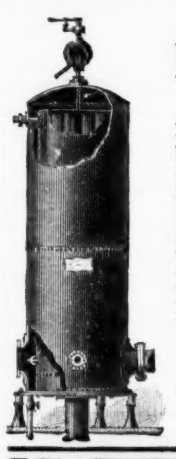

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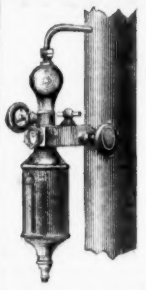

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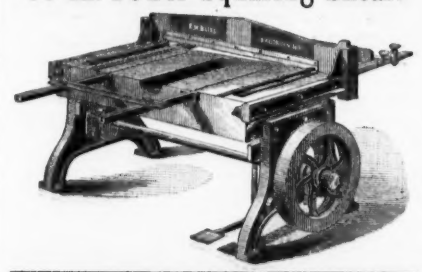

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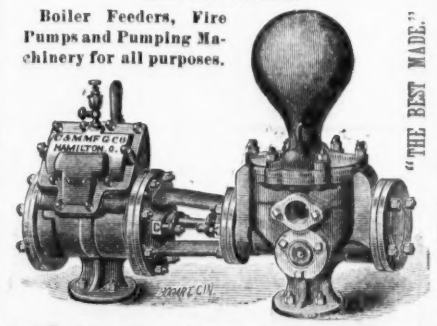

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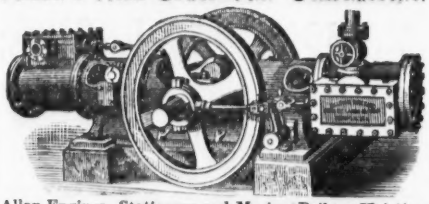

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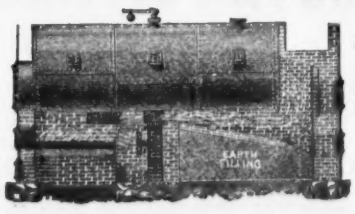

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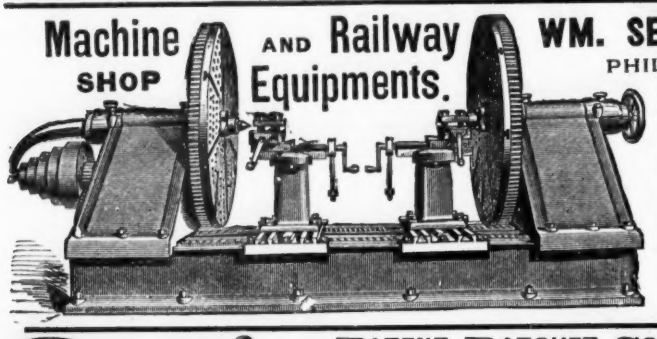

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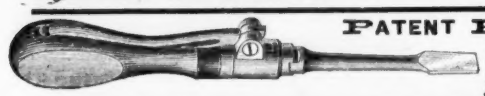

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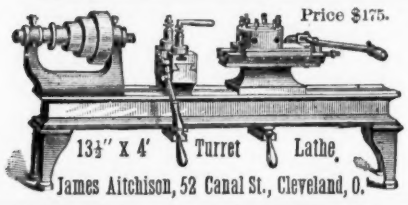

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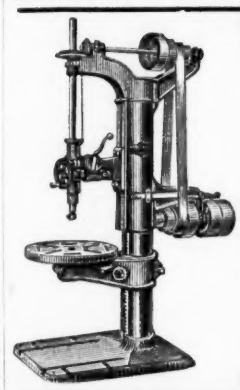

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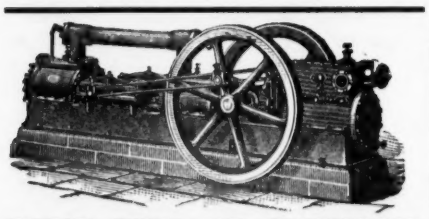

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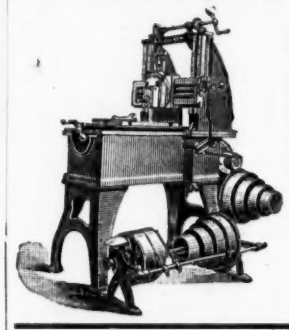

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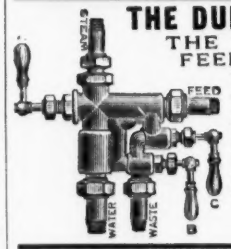

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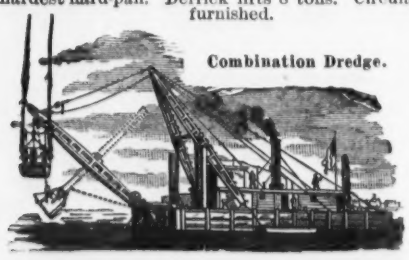

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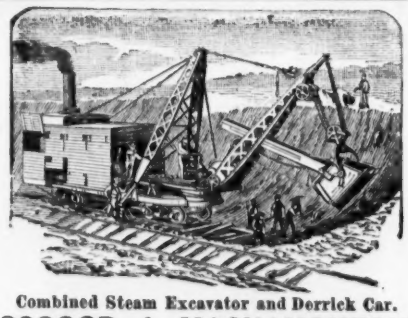

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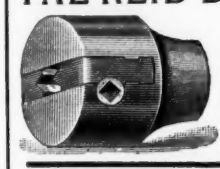

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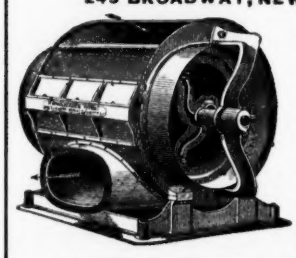

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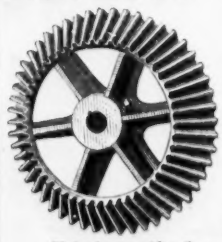

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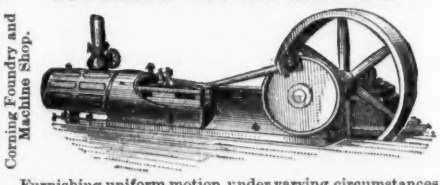

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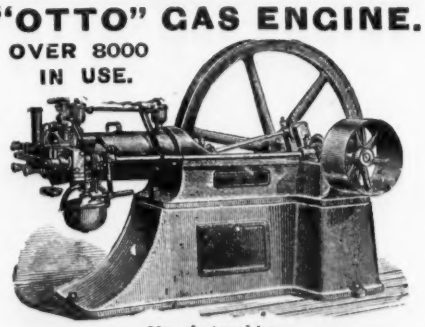

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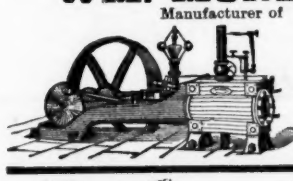

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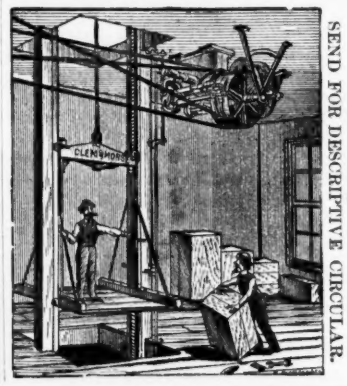

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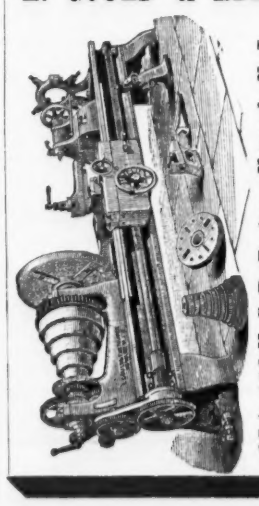

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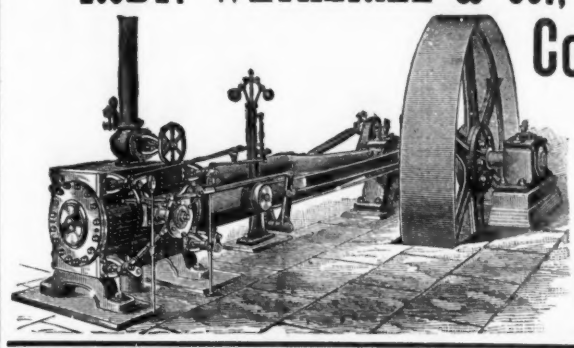

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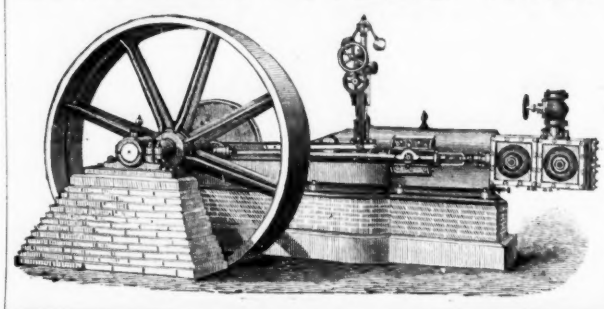

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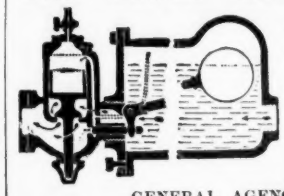

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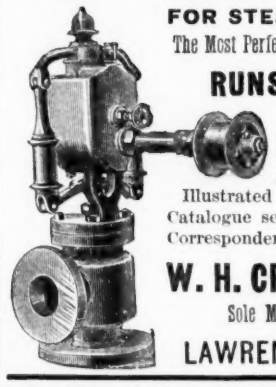

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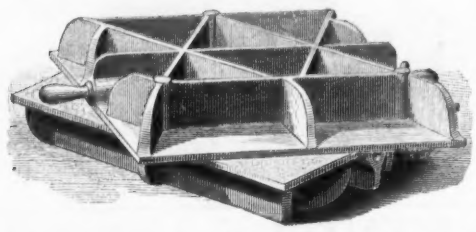

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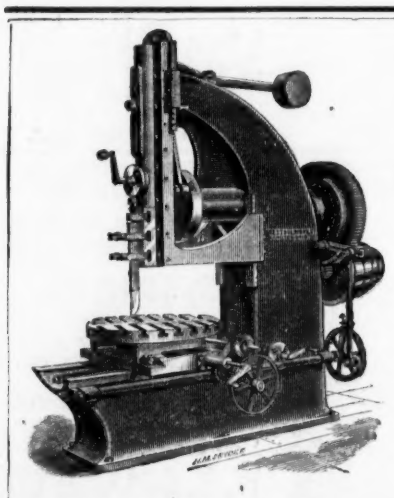

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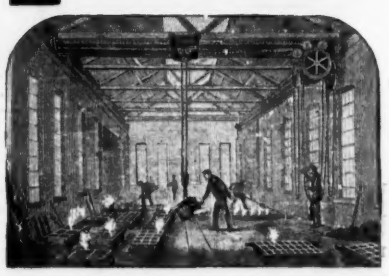

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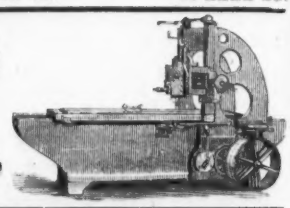

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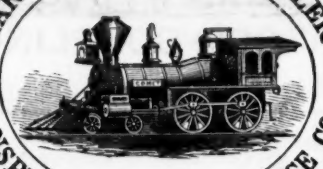

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